

THE IRON AGE

A Review of the Iron and Metal Trades.

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Interesting Facts and Official Data

Pertaining to the 1899

GRAND AMERICAN HANDICAP:

Number of full entries, 251, at \$25.00.....	\$6,275.00
" " post " 11, " 35.00.....	385.00
" " for felt " 16, " 10.00.....	160.00
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Of which total number 179 shooters used U. M. C. factory loaded
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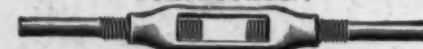
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See
page 103



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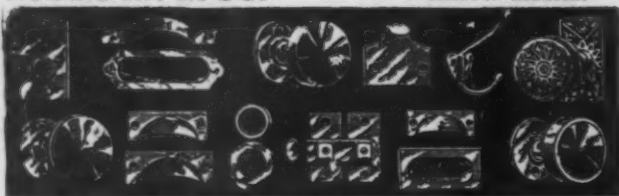
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THE IRON AGE.

THURSDAY, MAY 11, 1899.

Making a Solid Wrought Iron Steel Faced Anvil.

Although the ordinary anvil is being gradually displaced by steam and drop hammers, it is more than doubtful if it will ever be entirely superseded by any

The blacksmith's anvil must as prerequisites embody certain features. The body and horn should be able to withstand the severest usage, while the face should be of such material as to successfully resist the blows of a hard faced hammer, to resist chipping or flaking, and to be unaffected by the heat imparted by the article operated upon. It is essentially a rough and ready tool, in

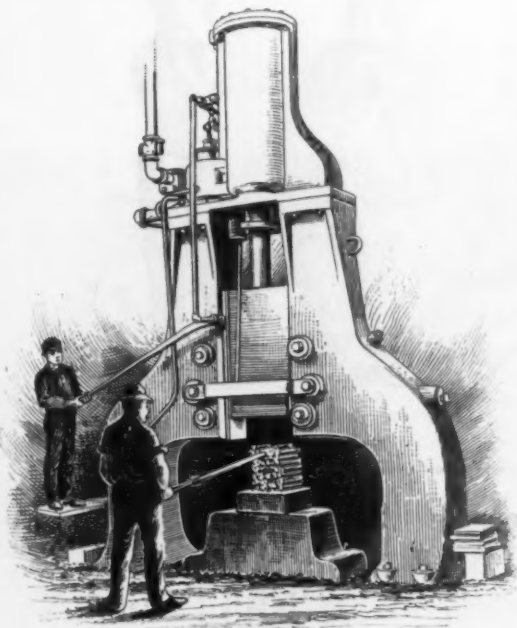


Fig. 1.—Hammering Wrought Iron Scrap.

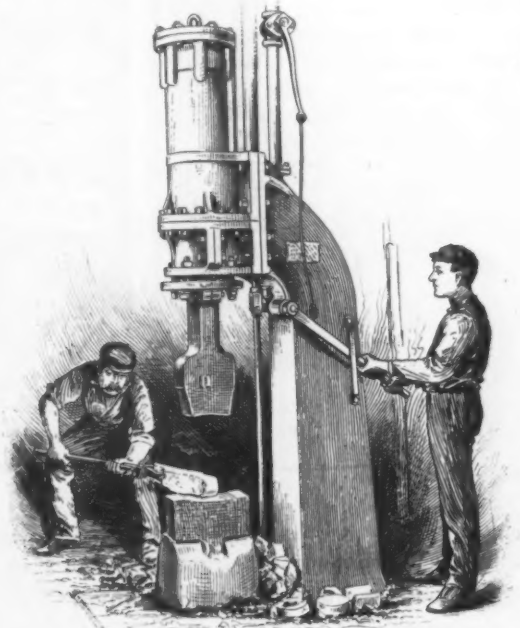


Fig. 3.—Forming the Horn Under Steam Hammer.



Fig. 2.—Welding Steel Face Under the Hammer.



Fig. 4.—Finishing the Horn by Hand.

MAKING A SOLID WROUGHT IRON STEEL FACED ANVIL.

other device or appliance upon which to pound and shape things. It is essentially an adjunct upon which the skill of the blacksmith depends in the closest degree, and without which his vocation would be seriously hampered. Its form has not been changed materially in the memory of man, the only alterations being such as have been required by special operations or the whims of the user.

the use of which but little discretion is exercised, and which, if it fails from any cause, will undoubtedly be emphatically condemned.

The tone of an anvil, upon which more or less stress has always been laid, may or may not mean that it is a superior article. While all anvils could not enter an "anvil chorus," it yet remains a fact that a poor anvil may have a rich and perfect tone and at the same time

be weak in its structure. On the other hand it may be put down as being almost axiomatic that the good anvil is invariably of good tone. Judging, therefore, its physical qualities by its musical characteristics is not always a safe and sure guide. The old blacksmith who has pounded for years upon the same anvil probably ap-

prime importance, since it controls the quality of the output. Skill in the manipulation insures good results as far as workmanship is concerned, but without perfectly adapted material to start with the utmost skill and experience would be thrown away. The best material may be, of course, spoiled in the handling, but a quality of

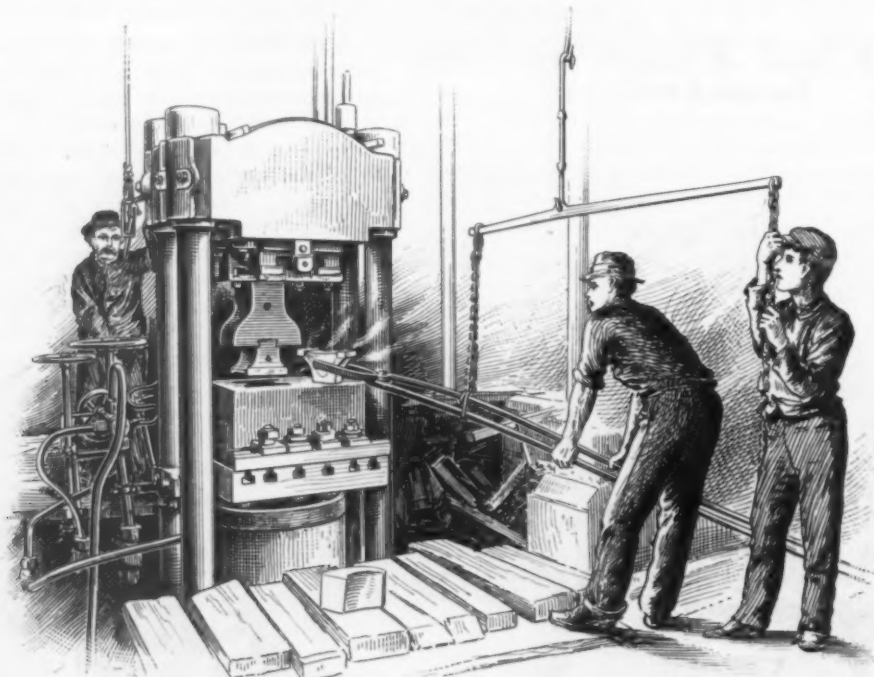


Fig. 5.—Forming Bottom of Anvil in Hydraulic Press.

preciates its ring more than any other feature, and to him it means a harmonious instrument of high grade.

Solid Wrought Steel Faced Anvil.

The wrought solid body steel faced anvil built by the Hay-Budden Mfg. Company of Brooklyn, whose works a representative of *The Iron Age* recently had the privilege of visiting, is made essentially of three parts: the wrought iron base, a wrought iron body and a steel face



Fig. 6.—Heating Top and Bottom Parts for Welding.



Fig. 7.—Welding Top and Bottom Parts Under Steam Hammer.

MAKING A SOLID WROUGHT IRON STEEL FACED ANVIL.

of special composition. In the making of an anvil these three parts are manipulated separately and brought as near as possible to their final form, when they are united by welding, the anvil brought to its true form, tempered and finished. The method of manufacture and the material employed in all the parts insure the integrity of the finished article.

It is very evident that the selection of material is of

the highest grade is necessary to perfect results. Wrought iron is used for the body of the anvil, for the reason that it is less liable to be injured by the successive heatings and hammerings to which it is subjected than steel, and for this reason the result can be more surely relied upon.

In watching the various operations one cannot but be impressed with the proportion of hand work. At every

single step except one the man is the important factor. It is the individual who judges the heat, controls the hammer and finally influences the form of the finished article. This dependence upon skill makes it impossible to produce close and accurate standards as far as size and contour are concerned, and since this is not absolutely essential but little attention is paid to it. One anvil may and does differ from another in magnitude, and since the work to be performed upon it is not of the accurate kind as understood in some mechanical operations there is no good reason why any attempt should be made to follow a pattern closely. In order to satisfy

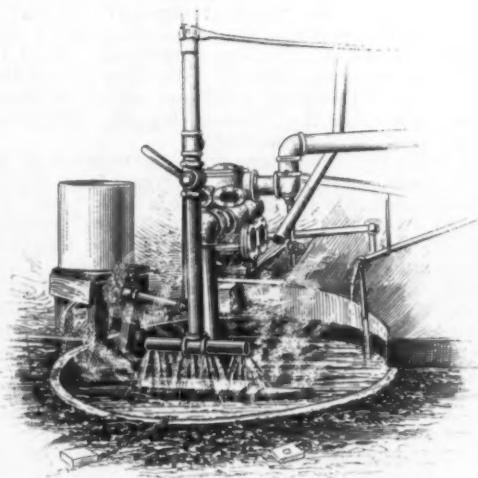


Fig. 9.—Hardening Face of Anvil.

furnace and welded into a compact mass under the steam hammer, as shown in Fig. 1. The billets then pass to a second furnace, after which their paths diverge. The one which is to be incorporated into the upper part of the anvil is rough hammered into shape and is then ready to receive the steel face. This is a flat bar of steel of such composition as will take a certain temper, maintain its elasticity and resilience, and be so tough as, with the aid of the wrought iron backing, to resist fracture. The billet and steel are heated in the same furnace and welded with the steam hammer shown in Fig. 2. From this engraving it will be noticed that the workman handling the billet places it upon a roughly curved die which forms the lower part of the upper part of the body. The blank then passes to another steam hammer, Fig. 3, with which the point is drawn down, the tail of the anvil rough shaped, and the given dimensions approached as near as may be practicable. The final operation on the top is done by hand, as illustrated in Fig. 4. The sides are here brought truly parallel, the horn is tapered and properly curved on the under side and the top practically finished. During

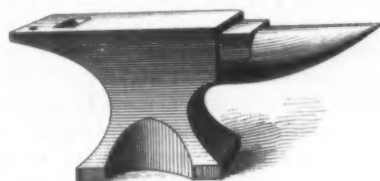


Fig. 10.—The Anvil.



Fig. 8.—Finishing Anvil by Hand Hammering.

MAKING A SOLID WROUGHT IRON STEEL FACED ANVIL.

the whims and to meet the various views of blacksmiths it is desirable to have a varied assortment of different widths, lengths and proportions for the same weight of anvils. This permits every blacksmith to find an anvil that suits his ideas.

As has been said, in only one step is the workmanship overshadowed by a machine—namely, in forming the base. This is an operation which has little to do with the final product, as it is simply a pedestal supporting the working face, and the method here pursued in making it is merely introduced as a labor saving and economical operation.

The Wrought Iron Billet.

The wrought iron scrap for the base and upper part of the body is cut to proper size, bundled, heated in a

these operations pritchel and hardy holes have been formed in the top of the anvil.

Another billet passes from the furnace to the hydraulic press shown in Fig. 5. What we may term the anvil of this press moves toward the rear, reference being had to the engraving, so that the billet can be dropped into the opening above the ram. The anvil is then moved back to a central position, water turned on and the ram is forced upward, completing the lower part of the anvil, with the exception of a slight burr due to excess of metal which has been squeezed out around the edge.

This finishes at one operation the bottom, which is next ready to be welded to the top. The small coke heated furnace shown in Fig. 6 supports both top and bottom parts, the parts to be welded being placed next

the fire. When the proper heat has been attained the base is placed upon the anvil of a steam hammer, the top centrally held upon it, as illustrated in Fig. 7, when the two parts are perfectly incorporated.

The next step, and one of the most important, as far as the appearance of the finished anvil is concerned, is illustrated in Fig. 8. From the welding hammer the anvil is taken to a cinder box, and by means of sledges the joint is thoroughly hammered down, the surfaces are sprinkled with water and smooth hammered to remove the scale, after which the hammer is placed face down in a furnace and when the steel portion has reached a dull red heat it is placed in the hardening tank, Fig. 9, and streams of water thrown upon it. The anvil is left in the tank until cool. Before hardening the anvil has been roughly ground on the face, and after hardening it is taken to large grindstones, where it is ground upon the edges and the face trued up.

Testing.

At first glance it would seem unnecessary to test each anvil. This would appear to be of little consequence, as the material is first intimately known, the various operations are carefully performed, and the product should seemingly meet the requirements in every instance; but this is not relied upon. Each heat of steel for the face is incorporated in one or more anvils, and upon their completion they are tested in every way possible with the hammer. They must resist indentation with a hard heavy hammer, must be free from all tendency to chip on the sides or flake on the top, and even under the most severe treatment must remain free from all cracks. Not only is this policy pursued when each new heat is commenced, but it is followed in the case of every anvil turned out. After grinding the body of the anvil is painted and the face varnished and covered with heavy burlap, which prevents the face from being damaged in shipping.

The Hay-Budden Company are now turning out about 100 tons of completed anvils per month, and their trade extends over the entire world. In this connection it may be of interest to note that during the past few years the importation of anvils into this country has steadily decreased. By far the largest supply of foreign anvils has been received from Great Britain, which country in 1893 sent here 1,567,746 pounds; in 1894, 704,764 pounds; in 1895, 1,085,054 pounds; in 1896, 859,580 pounds, and in 1897, 605,211 pounds. In 1898 the total importation amounted to 777,903 pounds, valued at \$47,797.

The Convention of the American Foundrymen's Association.

The following arrangements have been made by the foundrymen in different parts of the country for reaching Pittsburgh to attend the convention to be held in that city by the American Foundrymen's Association next week:

A large delegation of New England and other Eastern foundrymen will take the train known as No. 7 over the Pennsylvania Railroad, leaving New York at 7.40 p.m., May 15, arriving at Pittsburgh at 8.30 the next morning.

The committee in charge of arrangements at Cleveland have selected Pennsylvania train No. 342, leaving the Union Depot at Cleveland at 11.10 p.m., May 15, arriving in Pittsburgh at 8.40 Eastern time the following morning.

The Cincinnati foundrymen will take the Pennsylvania train No. 2 on the evening of May 15, arriving in Pittsburgh at 6 o'clock the following morning.

The Chicago committee have arranged for accommodations on the Pennsylvania Limited, leaving Chicago at 5.30 p.m., May 15, and reaching Pittsburgh at 7 o'clock Eastern time on the following morning.

The American Steel Casting Company have declared a semi-annual dividend of 3 per cent. on the common stock.

Julian Kennedy, the well-known engineer of Pittsburgh, and Robert Forsyth, representing J. P. Morgan & Co. of New York City, last week appraised the plants of the American Tube & Iron Company, at Youngstown, Ohio, and the Warren Tube Company, at Warren, Ohio. These two plants are to be taken over by the National Tube Company, now being organized.

Blast Furnace Compared with Cupola Practice.*

BY EDGAR S. COOK, PRESIDENT WARWICK IRON COMPANY, POTTSTOWN, PA.

Casting Machines for Foundry Irons.

The increase of the daily product of the modern blast furnace has called the attention of managers to the necessity of improved methods for casting and handling the large tonnage of iron.

Not many years ago all the pig iron made was cast in pig beds molded in sand. Even with modern products there has always been more or less trouble in securing men to remove the iron from casthouse. Few men, comparatively, have the physical strength, or, having the strength, care to perform this exhausting labor day after day, Sundays and legal holidays included. Blast furnace work is absolutely continuous. We have no holidays, and if the men to fill certain positions are not on hand they must be replaced or the furnace stopped. Frequent stoppages are costly and disastrous.

The difficulty is not alone with the removal of the iron from the beds. After the iron is tapped from the furnace and distributed into the 20 or 30 beds each "pig" must be separated from its "sow," and the "sow," running the length of each bed, must be broken into lengths corresponding approximately with that of the pig. This work is usually done when the iron has become sufficiently solid to bear the weight of a man and not bleed or run when separated. This is hot and exhausting work, especially in the summer months, and not unfrequently is the source of the greatest anxiety to the manager. Many men cannot withstand the burning heat, and succumb, thus discouraging others, who are only too ready to avail themselves of any excuse to escape the trying ordeal.

The pigs must be separated from the sow, and the sow broken, otherwise the iron cannot be removed and the beds molded for succeeding casts, the casts following one another every four or five hours.

Various mechanical appliances have been proposed from time to time, but one objection or another prevented their adoption. Furnaces connected with steel works substituted for the sand beds iron molds, or chills, as they are termed. These chills obviated the necessity of molding in sand, thus economizing in labor and saving time, and thereby increasing the capacity of the casthouse, but their use did not overcome the necessity of breaking the pigs from the sow, &c. The labor of removing the iron from the casthouse also remained the same.

With the advent of the basic open hearth steel furnace the demand for iron low in silicon and free from surface sand brought about the introduction of iron chills or molds by merchant furnaces proposing to make basic iron—that is, iron of a composition to suit the requirements of basic steel manufacture. Many of the casts run into these chills, upon being analyzed, were found not to meet the specifications of the buyer, being too high in silicon or too high in sulphur. This iron became known as "misfit iron," necessitating its sale for some other purpose. The high sulphur pig was found suitable for puddling, a reduction in price being made to effect a sale, simply because it was misfit iron. The puddle mills were thus made acquainted with sandless pig iron, and although introduced at some disadvantage it is now used on the same terms as pig cast in sand. Some mills express a decided preference in favor of the clean iron, free from adhering sand. The misfit basic high in silicon found its way to foundries, to be remelted and run into castings. It might or might not have been of a composition to suit their requirements. Whether it was or not, it labored under the disadvantage of being a misfit iron, and was naturally looked upon with suspicion.

Casting machines or tables are now replacing the chills in the Bessemer furnaces of large capacity. These tables, when well constructed, are likely to give the relief so long sought for, obviating the necessity for a casthouse, and do away with the exhausting and troublesome labor referred to. The furnace is tapped at such intervals as may be found convenient and the molten iron run into ladles or cars of 20 tons capacity or larger. Each car, as filled, is then poured into molds of cast iron or of stamped steel plate, coated with a wash of clay or lime, the mechanism of the table being so arranged that the molds move slowly in front of the ladle. It is evident that each lot of 20 tons, the ladle serving as a mixer, when poured into molds of the same section and cooled under the same conditions, must be practically uniform, one pig compared with the other.

The steel trade, having arrived at an exact knowledge of the kind of pig iron required, is able to specify the analysis wanted. All purchases are made without reference to the accident of fracture. The limitations as to

* Read before the Foundrymen's Association of Philadelphia, Pa.

silicon and sulphur, to say nothing of phosphorus, are the determining factors. To the best of my information, sandless pig is preferred by Bessemer works to that cast in sand, while for basic steel manufacture sand pig will not be accepted. Foundries connected with steel works have been using sandless pig for a great variety of castings with entire satisfaction, the management simply specifying the analysis of the pig required.

Fracture as a Guide.

From time immemorial the general foundry trade has been judging and determining the comparative values of irons for different purposes by the fracture, without reference to the chemical composition. The experienced, observing man is able to make, at times, fairly correct guesses as to the quality of an iron, drawing his conclusions from the color of the fractured surface, the size of the crystallization, as well as the face of the pig. Demands on the foundry are now far more exacting than was the case years ago, and the margins of profit much smaller, calling for more exact methods, less guess work, and greater certainty as to the character of the castings.

It has been a matter of the greatest surprise and wonderment to me, upon visiting certain foundries, where the "rule of thumb" held perfect sway to the entire exclusion of any technical knowledge, that the mistakes and errors were not more serious practically and disastrous financially. If I were compelled, however, to make a choice between a practical man, thoroughly well acquainted with foundry work, a man of good judgment, but possessed of no chemical knowledge, and a theorist, equipped with all that technical schools and a course in chemistry can give, but with little or no practical acquaintance with foundry conditions, I would certainly take my chances with the former. There is no reason, however, why the better qualities of both may not be combined in the one man. There is now so much literature on the subject of cast iron as applied to foundry work that any fairly intelligent man can soon acquire all the chemical knowledge required to assist him in adjusting the mixture of iron, guided by the analyses furnished by an expert chemist, to suit the varying requirements of complicated or simple castings.

The most successful blast furnace managers are those who, by daily contact with furnace operations and close application, mastered the practical details, and then supplemented this training by technical studies, to gain a knowledge of the value of the composition of ores, &c., as well as of the slag and iron product. When I first became acquainted with blast furnace operations they were conducted entirely on a system of guess work, so far as the material filled into the furnace was concerned. Analyses of slag or of the iron produced were seldom or never made. If anything went wrong, causing irregular work and reduced product of iron, with consequent increased cost, the blame was invariably placed upon the ore or coal. It was so much easier and satisfying to place the responsibility for one's own mistakes and errors upon the party supplying the raw material. As long as this system prevailed there was no chance of improvement. The modern blast furnace became a possibility only with more intelligent management, the management that without neglecting the teachings of practical experience availed itself of all the help afforded by chemistry to unfold a knowledge of the composition of the material used, the value of the various elements in their numerous combinations, as well as the composition of the iron produced.

The data thus acquired by blast furnace managers as to the qualities of various grades of pig iron, the influence of silicon and sulphur, &c., have been of more or less value to foundries. We have thus been enabled to approximately determine the composition of pig suited to varying foundry requirements, supplemented by the study of analyses of castings that were proven to be satisfactory. A blast furnace run in the old way could not now exist in competition with one managed under scientific methods.

Unless all signs fail, the same rules of growth and existence will hold good as applied to the foundry trade, and the survival of the fittest will, sooner or later, compel all foundries to avail themselves of the help afforded by scientific methods. Many foundries are under most excellent management. There are many able men connected with foundry work, combining practical experience with technical attainments. These men know what they want, and are thus able to specify as to the composition of the pig iron required, and their specifications, as a rule, are reasonable from the standpoint of the blast furnace manager, which cannot be said of all the specifications submitted by agents. To such men the accident of fracture is immaterial, so long as the elements named are within the limits specified. The percentages of silicon and sulphur determine, in great measure, the adaptability of an iron for general foundry work or for special work. They take advantage of the general trade custom of grading by fracture, the market price varying with the grade, to buy a No. 2 iron and at the same time specify a composition that can only apply to a No. 1 iron. As soon as foundries

generally are sufficiently well informed as to the composition of the iron they require, to specify the limits of silicon and sulphur, just so soon will the old system of grading by fracture disappear, and they will then be prepared to take advantage of the benefits afforded by the use of sandless pig iron, or pig cast into iron molds.

Sandy Iron.

It would be presumptuous for one having no practical acquaintance with foundry conditions to advise or dictate to experienced men, but I am at a loss to conceive what benefit can be derived from converting into slag 20 to 30 pounds of sand for each ton of pig melted in the cupola. There is a bare possibility that the slag thus made, in connection with the ashes of the fuel, is of assistance in removing the sulphur of the fuel. If this should prove to be the case it would be a simple matter to add to the charge of clean pig as much sand as may be required to make the necessary volume of slag. Much of the difficulty experienced in soft and gray foundry work is due to the melting of the pig in the cupola in contact with mineral fuel carrying more or less sulphur. The presence of manganese in the pig helps to remove the sulphur, but it is rather an expensive flux, paid for, as it is, at the price of iron. The same may be said of sand if its only use on the pig is to increase the volume of slag. While it is true that a certain allowance is made for sand on the pig, it is doubtful whether the purchaser obtains 2240 pounds of actual iron for each ton. The allowance made for sand is to cover the loss in handling, so that the purchaser may receive not less than 2240 pounds of iron, plus the sand that adheres tightly. With the use of sandless pig the purchaser would always receive 2240 pounds of iron.

Temperature and Sulphur.

There are many points of resemblance between blast furnace and cupola practice, enough to permit of arguing from one to the other. We have found that temperature, other things being equal, determines the percentage of sulphur in the pig. At high temperature of crucible of furnace there is but little affinity between iron and sulphur; the slag takes up the sulphur, leaving the iron comparatively free. An unexpected stoppage or a leaky tuyere, or any cause lowering the temperature of the crucible, will act to reverse these relations. The sulphur will attach itself to the iron. Sulphur in the pig increases the percentage of combined carbon and lowers the graphitic, thus affecting the crystallization but not necessarily changing the percentage of silicon. Thus it is that we occasionally get iron high in silicon and at the same time high in sulphur, high in combined carbon and low in total carbon. This iron might show a fairly good fracture in the sand pig, but if cast in an iron mold the high sulphur would develop a chill in spite of the silicon, thus indicating very plainly that the iron was not suitable for light castings or castings that were required to be soft enough to machine easily.

In the cupola, however low the pig iron may be in sulphur, if not melted down hot sulphur will be absorbed from the coal or coke, and the casting will be high in sulphur. Very few cokes will average less than 1 per cent. of sulphur, while anthracite coal will carry from $\frac{1}{2}$ to 1 per cent. High sulphur in the casting will cause the iron to be hard, owing to formation of combined carbon, and coming into contact with the damp sand of mold, it will take a chill, and excessive shrinkage will develop.

The knowledge that the iron mixture is all right would enable the manager to locate the cause of the trouble. While it might be easier to blame the pig and claim a reduction in price, yet this does not remove the real cause, and the trouble is likely to reappear again and again, causing delays and loss.

While it is perfectly feasible to increase and multiply many times the percentage of sulphur in the pig by remelting in the cupola at too low a temperature, no elevation of temperature will reduce the percentage of sulphur in the melted iron below the percentage contained in the pig or scrap charged, though good cupola practice may prevent any considerable increase through absorption of sulphur from the fuel. The blast furnace and the puddling furnace, and possibly the basic steel furnace, can break up the combination of iron with sulphur and eliminate the sulphur, but the cupola cannot. Hence all scrap, as a rule, carries a larger percentage of sulphur than the higher grades of foundry pig iron. All grades and compositions of pig have their uses, and even sulphur is valuable to fulfill certain requirements. The whole difficulty consists in knowing just what is wanted in any particular case and then adjusting mixture to suit.

In blowing in or starting a blast furnace some years ago the first couple of casts were usually worthless, a sort of nondescript iron, fitted neither for foundry nor mill use. It was made with a hot furnace above the tuyeres, but in the crucible, below the tuyeres, it underwent changes for the reason that the crucible was not hot enough to maintain the temperature of the slag and iron. This was corrected by increasing the blank charge of fuel to such an extent that there was no possibility of either slag or iron

reaching the crucible until its temperature was sufficiently high to prevent any change in either. Now the first cast of iron will show about the same quality of product as any of the subsequent casts. I would argue from this experience that in cupola practice it not unfrequently happens that melted iron reaches the bottom of cupola before the temperature is sufficiently high to prevent the iron from undergoing chemical changes. When this iron is poured into molds the castings are often worthless. The iron as charged at the top may be all right; as drawn at the tapping hole it is all wrong. Blaming the pig and changing the mixture will not correct the fault. Positive knowledge as to the composition of the iron mixture and equally positive data as to the requirements of the castings to be made would remove elements of uncertainty and enable the manager to locate the trouble, so as to avoid a repetition.

Atmospheric Moisture.

We also find that atmospheric moisture plays an important part in the economy of blast furnace work. Roughly speaking, about 5 tons of air are required to make 1 ton of iron. Last June and July 245 pounds of water in the shape of vapor was driven into the tuyeres for each ton of iron made, or over 125 tons of water in a week. The usual average for a year is about 160 pounds of water per ton of iron, but of course this varies with the location of furnace as well as the season of the year. The water is converted into oxygen and hydrogen gas at the expense of fuel in the crucible. Unless this is provided for the temperature is lowered sulphur in the iron increases, changing the relative proportions of graphitic and combined carbon, affecting the fracture and the market value.

Cupola practice is affected in the same way, but to a less degree, because in melting iron much less air is used per ton than is required to make the iron. It is, however, an important factor, and must be provided for to guard against bad heats.

We have also learned that coke, if exposed, will absorb from 10 to 20 per cent. of its weight of water. If coke is charged by weight, one day we may get 600 pounds of coke per barrow and another day 500 pounds coke and 100 pounds water, which is a poor substitute for carbon. On the other hand, different cokes vary in specific gravity, equal bulks varying 10 to 15 per cent. or more in weight. If the furnace is charged by volume, while the absorption of water is provided for, we are subject to violent fluctuations because of variation in actual weight of carbon, if cokes of differing specific gravities are used. All of these causes must be guarded against in blast furnace practice to insure uniform results and economical working, and the same causes apply more or less to cupola practice.

There are a hundred and one causes affecting the character and quality of castings produced by a foundry other than the fracture, grade or quality of pig iron used. Such being the case, it becomes all the more important to eliminate, by the application of scientific and technical helps, such of the disturbing causes as are within control. There has been so much written of late upon the chemistry of cast iron as applied to foundry practice, the influence of the several alloys, silicon, sulphur, carbon, phosphorus, &c., that it is not worth while for me to discuss the subject, however attractive it may be. My object has been to call attention to causes of trouble that are not often referred to. Other causes will suggest themselves to every experienced foundryman that pertain solely to the foundry, especially to the fine art of molding, designs of patterns, treatment of sand, pouring of iron, condition of cupola, volume of air, &c.

The furnace manager has his own troubles also. To one well acquainted with the casthouse work of a blast furnace the molding of the pig beds, the running or casting of the iron and the physical causes by which the fracture of the iron is influenced, it has been a wonder that notwithstanding the advance in technical information so much stress should still be placed by our foundry friends upon the accident of fracture as governing the quality of the iron to be used for any particular purpose. I do not question that the fracture is a guide to a certain extent, and the fact that it has been so long employed, in the absence of any better method, is proof of its old time usefulness. There is room for so many mistakes and errors, however, that have been developed only by the accumulation of hundreds and thousands of analyses, that it would seem that this custom should no longer stand in the way of improvements that ultimately would prove of more or less benefit to the foundries.

Causes Affecting Fracture.

There are many causes affecting the fracture independent of the composition. The fracture may be a reasonably safe guide to the blast furnace manager, especially if he has made a study of many analyses, comparing them with the physical appearance of the iron, and knowing the conditions under which the iron was made and cast. I do not know of any better pyrometer to deter-

mine the relative temperatures of the blast furnace than the silicon and sulphur contents of the iron. The time of cooling, or, rather, of the passage from liquid to solid state, and the silicon contents, are exchangeable terms, the total carbon being constant. Large masses cool slowly; graphitic carbon separates, even if silicon is very low. If the section of a casting is $\frac{1}{4}$ inch or less, causing the hot metal to cool quickly, silicon must be high to compel or force carbon to assume graphitic form, in spite of the rapid cooling. When a furnace containing 40 to 50 tons of iron is tapped, under a blast pressure of 8 to 10 pounds per square inch, the flow of metal down the main runner, supplying the rows of pig beds, may become unmanageable. The more rapidly the iron is run, other things being equal, the more open will be the fracture and the larger the proportion of No. 1 X. We therefore aim to run foundry iron as fast as the men can handle it. Some beds may be sheeted or filled to overflowing, while others may only be partly filled. The large pigs will go into the No. 1 X pile, while the smaller ones, from adjoining bed, may be piled as No. 2. Some of the beds may not be level; they may hang too much in one direction. One-half of the pigs may be filled to overflowing and the balance only partially. The bed is cut off. The iron seeks its own level, passing from one set of pigs to another. The flow of the iron disturbs the crystallization, so that the pigs first filled, and from which the iron flowed to fill up the others, will show a No. 2 or even a No. 3 fracture, while the balance of the bed, and the beds adjoining above and below, may be No. 1. The face of the pigs thus drained will show a concave surface, because of the metal being withdrawn from the interior, while the pigs receiving this iron will have a convex face. The foundryman condemns the one because its appearance indicates high shrinkage, while the latter is entirely acceptable.

The first three or four pigs in each bed, the pigs that fill first, will almost invariably be No. 2, or even No. 3, in fracture, while the balance of the bed may be No. 1, for the reason that the iron is not at rest; the movement of the metal—some molds filling up and then emptying partially—interferes with the law governing the formation of large crystals. Sometimes an obstruction in the tapping hole causes the flow of iron to almost cease for a few minutes. If a bed happens to be only half full the fracture will show No. 2, while the preceding bed, run more rapidly and completely filled, will be No. 1. Slow running is destructive to open crystallization, while rapid running and slow cooling is favorable to open iron and a large percentage of No. 1. Now when we find that all of this iron is practically of the same composition, made under the same furnace conditions, and that the differences in fracture are due solely to physical causes, the fallacy of grading one pig No. 1 and another pig, only a couple of feet distant in the same bed, No. 2 or even No. 3, becomes evident.

Any inference that all the iron graded and sold as No. 2 and No. 3 foundry is sorted from No. 1 casts, and has the same composition as No. 1, would be far from the truth. While it is true that a certain percentage of the lower grades show the same analysis as No. 1, yet by far the greater tonnage is made under different furnace conditions and will show different analyses. It sometimes happens that a foundry receives No. 3 grade, selected from a No. 1 cast, and finding that it answers the purpose just as well as No. 1 the buyer jumps to the conclusion that he will save considerable by using the No. 3, and places his order for a large amount. The next car received, while of approximately the same fracture, may have been made under different furnace conditions and be of entirely a different composition. Trouble follows and misunderstandings arise.

Our pig beds are necessarily kept very wet, otherwise the cores will not stand. The molten iron is run 50 or 60 feet in the main runner and subdivided into smaller streams into equally wet beds.

Chill versus Sand Molds.

It has been noticed that the same iron run into chill molds shows higher percentage of graphitic carbon than when run into the sand beds. This can probably be accounted for from the fact that the iron molds are dry and frequently warm. The following analyses, made by H. V. Wille, chemist, of Burnham, Williams & Co., will illustrate this:

—December 30, 1895.—		
	Warwick Cast No. 81. Chill molds.	Cast No. 81. Sand pig.
Graphitic carbon.....	2.87	2.57
Combined carbon.....	0.48	0.42
Total carbon.....	3.35	2.99
Manganese.....	0.42	0.41
Phosphorus.....	0.36	0.36
Sulphur.....	0.017	0.010
Silicon.....	1.50	1.52

However regular any furnace may be working, and however uniform in appearance any cast may be, there is

an unavoidable variation in the composition of one bed of iron of any one cast compared with every other bed, and a variation between pigs of the same bed.

Sampling Iron.

For some years past we have been sampling every cast liquid. The iron is taken from the main runner and poured into iron cups. The bottom of cup is 1 inch thick and the depth of liquid metal in cup is about 1 inch. These samples, as soon as they can be removed from cups, are quenched in water and drilled. The borings are mixed thoroughly and analyzed. Frequently several analyses may be made for one cast, if any considerable difference is noted in different parts of the cast.

In order to secure practical uniformity the different beds of a cast are broken over a block, the different pieces are then sorted and piled by fracture, and by the time they are again handled in loading a car there is such an intimate intermixture that the car as loaded is fairly represented by the cast analysis. We invariably get two grades by fracture from each cast, and sometimes three, so that we will have two or three piles of iron, No. 1, No. 2 and No. 3 foundry, by fracture, all of the same analysis.

Even in the same pig the appearance of the fracture depends upon whether the pig is broken in the middle, close to the sow, or close to the end or point. The crystals are the largest nearest the sow, the end that cools the slowest, while near the point they will frequently be small and lighter in color, because of more rapid cooling. To strike a fair average we aim to break each pig in the middle. If the pieces are rebroken at the foundry there will be found a considerable variation. The half next to sow when rebroken may be open, while the other half may be close. The crystals in sow are more open than those of the pigs in the same bed, as the section is larger and the cooling proceeds slower. Hence it is that some furnaces make pigs of large section to please the eye of the consumer.

Uniformity can only be secured by unceasing watchfulness and the exercise of the greatest care, together with the help afforded by analyses. We have paid special attention to uniformity of shipments, and while any one or two pigs may not show the same analysis, differing from one another and differing possibly from the average of the cast, yet the cast analysis will fairly represent the iron as used in quantity.

Uniformity can only be secured by selection, guided by analysis, and by intimate intermixture. Appearances are very deceptive, even to the furnace manager, with all the helps afforded by knowledge of furnace conditions. Every cast may vary more or less from every other cast of foundry iron.

The use of iron by brands or names or grades does not furnish any guarantee of uniformity unless there is selection and care exercised at the furnace. We are more or less dependent upon ignorant and inefficient help subject to errors of judgment and of ignorance and carelessness, so far as grading by fracture is concerned.

Casting Machines and the Foundry Trade.

We have recently been considering the adoption of a casting table. A favorable decision is necessarily dependent upon the favor with which such a departure from old methods will be received by our foundry customers. The mill consumers will offer no objections, but there is more or less doubt in regard to the foundry trade, especially the smaller class of foundries. I question whether there would be any pecuniary advantage to the furnace company, as the investment for one furnace would be so large as to counterbalance any possible saving in cost of handling our product in this way as compared with sand pig. Our advantage would consist in doing away with the most arduous work around the furnace and at the same time enable us to insure greater uniformity in our shipments and be less dependent upon ignorant and unskilled labor. In explanation of this statement the following method of procedure will probably be convincing:

Upon tapping the furnace the molten iron will be run into 20-ton ladle cars; a cast of 40 tons will require two cars. When the first car is filled the iron will be poured into molds made of cast iron or plate steel, coated with loam or lime to protect them and prevent sticking. It is evident that the iron of the first ladle will be so intimately mixed by the filling and the pouring that each mold will contain iron practically of the same composition, which will be cooled under practically the same condition; hence the lot of 20 tons, pig for pig, will be more nearly uniform than is possible under the present method of running an equal tonnage into ten different beds.

Each ladle will be sampled and analyzed, so that the composition of each carload of 20 tons will be definitely known.

The effect of the iron mold upon the fracture of the pig will probably be to tighten or close the grain somewhat, so that the present custom of grading by fracture would have to be modified to meet the changed conditions, or a system of grading developed depending upon the composition.

For instance, an iron of

Per cent.	
Silicon, 2.50 to 3.00.....	No. 1.
Sulphur, 0.02 or less.....	
Silicon, 2.00 to 2.50.....	No. 2X.
Sulphur, 0.02 and under.....	
Silicon, 2.50 to 3.00.....	No. 2 soft.
Sulphur, 0.05 or less.....	
Silicon, 2.00 to 2.50.....	No. 2 plain.
Sulphur, 0.05 or less.....	
Silicon, 1.50 to 2.00.....	No. 2 strong.
Sulphur, 0.05 or less.....	
Silicon, 1.50 to 2.50 ..	No. 3 foundry.
Sulphur, over 0.05.....	

In the absence of any grade number specifications would call for the silicon and sulphur to suit the particular requirements of the purchaser. If pig iron was used directly in the form in which it comes from the furnace—that is, if the pig itself was planed and drilled, &c.—the objection that the chilling action of the iron mold would harden the surfaces of the pig might be valid enough, but as the pig is remelted this objection would seem to lose its force.

Other things being the same, the temperature of the blast furnace determines the composition of the iron, and the composition of the iron after being remelted in the cupola determines as a rule—occasionally apparent exceptions occur—the quality and fitness for any particular class of castings, whatever may be the method of casting at the blast furnace, whether the iron is run into wet sand, dry iron molds, or granulated by running water. In the latter case all of the carbon would be combined, and the particles or pebbles of iron would be white. If the iron thus changed to white by rapid cooling had been made in a hot furnace and contained 3 per cent. silicon and not over 0.02 or 0.03 per cent. sulphur, upon remelting in a cupola it would make a soft gray stove plate or the lightest hardware casting, without any evidence of chill. This has been practically demonstrated.

Metal Mold Iron Better Indication of Quality.

Our experience with our sample chill cups, extending over many years, and representing thousands of casts and analyses, would prove that iron cast in metal molds instead of sand will indicate to the purchaser, after a little experience, more accurately the quality of the iron for foundry uses than it is possible to gather from the fracture of any sand pig. We can guess approximately the composition of any cast by the appearance of the fractured chill cup samples, while we would go far astray very frequently if we relied upon the fracture of the pigs of the same cast, as the fractures vary so greatly, depending upon the sizes of the pigs, the manner in which the iron was run, &c. By comparing the chill cup samples day after day with the analyses we find that the chill cup not only acts as a guide so far as the silicon is concerned, but is an infallible detector of sulphur.

Our pig iron, low in manganese, with 1.5 per cent. silicon and sulphur down to 0.03 per cent., will not take a chill in this cup. If the silicon falls to 1 per cent., with sulphur 0.02 per cent., there may be a slight chill, but let the sulphur increase to 0.08 per cent., a chill $\frac{1}{2}$ inch in depth will show. Pig with 2 to 3 per cent. silicon, and sulphur up to 0.05 per cent., will not chill in the cup, but if the sulphur increases to 0.10 per cent., even 3 per cent. silicon iron will show a chill.

The chill caused by sulphur is entirely different in appearance from that produced by low silicon and is easily distinguished. With pig of 0.50 per cent. silicon and low sulphur the test piece 1 inch thick will show $\frac{1}{2}$ inch chill. If the sulphur is high, say about 0.10 per cent., the test piece will be solid white.

The most beautiful iron of No. 1 fracture is the low silicon and low sulphur variety, with high carbon. Such an iron, remelted in a cupola and run into thin castings, would be white and brittle. Run into heavy castings, like ingot molds, it will be soft and strong, outlasting many times the ingot molds made of 2 to 3 per cent. silicon pig. Our experience with the chill cup test pieces, showing the influence of sulphur, has enabled us to render more or less assistance in accounting for many of the troubles our foundry friends encounter.

It is not common for the higher grades of the best makes of foundry iron to contain sufficient sulphur to be injurious, but in remelting, if the cupola is not hot enough, or if the bottom is too cold to receive the iron, the absorption of sulphur from the fuel is frequently ruinous. Hot, high silicon iron, coming into a comparatively cold bottom, or tapped into damp and cold ladles, will undergo chemical changes, causing a white core, surrounded by a gray skin, that frequently causes the loss of many light castings.

Foundries, therefore, that operate on too small a scale to warrant the employment of a chemist, or large foundries depending upon the analyses furnished by the furnace company supplying them with iron, can soon learn to judge sandless pig and determine the quality by inspection much more accurately than is possible with sand pig, however experienced and skillful the inspector. In purchasing a carload of sandless pig the buyer is sure

to get as many pounds of iron as he pays for. It will not be necessary to melt tons of sand in a year, except as it may be found necessary to use it as a flux, and then it can be added in the shape and in the quantity that may be most convenient and economical.

The secret of success in foundry as well as in blast furnace practice is to know enough to know how little one knows and how much there is to be known, close application and hard work. I quote as follows from a recent letter of Thomas D. West:

"You may not be aware of it, but the fact is that if one-half of one cast is run into sand molds and the other half into chill molds the latter would give the softer iron when remelted. Chilling of pig metal can only affect the state of the carbon. The silicon, sulphur, manganese and phosphorus remain the same in both cases, so that as long as you have 2.50 to 3 per cent. silicon and not over 0.02 per cent. sulphur in the cast it matters not if the pig showed a chill, the iron would make a softer casting than had it been cast in sand molds."

As a matter of fact, it is extremely doubtful whether a pig iron with 2.50 to 3 per cent. silicon and 0.02 per cent. sulphur could be made to show a chill by casting in any iron mold. It would have to be run into water in order to cause sufficient carbon to assume the combined form and thus cause the iron to become white.

When the blast furnace is making high grade of foundry iron the atmosphere of the casting house, when the iron is being run, is filled with kish or graphite, thrown off by the molten iron. The trough and sand runners frequently show graphite in abundance. When the molten iron is at rest in the beds graphite can be noticed floating on the surfaces of the pigs. As the iron cools slowly the graphite seems to accumulate on the surfaces, the quantity increasing the slower the iron passes from the liquid to solid condition. When the same iron is cooled quickly, as frequently happens when a bed is partially sheeted, and a thin layer spreads over the cores, dividing the pigs, this does not separate graphite. The quicker cooling seems to confine the carbon and keep it in the iron. Of course the graphitic carbon that exudes is washed off when the pigs are sprinkled with water and is lost.

The exudation of carbonaceous powder on the pigs is the more evident the lower the silicon contents—that is, with the iron carrying 1.25 to 1.75 per cent. silicon the amount of carbon thus separated is apparently greater than when the iron carries 2, 2.50 or 3 per cent. silicon. The face of this pig has a peculiar etched appearance, indicative of strong pig.

A hot furnace, and consequently low sulphur, is a necessary condition. This fact may explain the assertion of Mr. West. Iron run into chills sets more rapidly than when cast in sand, which may thus act to retain the carbon. The analysis of Mr. Wille, chemist, of Burnham, Williams & Co., of cast No. 81 shows 3.35 per cent. carbon in the pig cast in chill molds as compared with 2.99 per cent. in the sand pig.

The same chemist made determinations of other casts of Warwick iron as follows:

Cast No. 83, Warwick Iron.

	Sand pig.	Chill Molds.
Combined carbon.....	0.42	0.68
Graphitic carbon.....	2.48	3.03
Total carbon.....	2.90	3.71
Manganese.....	0.40	0.51
Phosphorus.....	0.42	0.41
Sulphur.....	0.012	0.056
Silicon.....	1.52	1.24

Cast No. 91, Warwick Iron.

	Sand pig.	Chill Molds.
Combined carbon.....	0.49	0.54
Graphitic carbon.....	2.03	3.01
Total carbon.....	2.52	3.55
Manganese.....	0.52	0.51
Phosphorus.....	0.38	0.44
Sulphur.....	0.010	0.010
Silicon.....	1.38	1.28

"We have not run any iron into chill molds since the early part of 1896, and have no further data on this subject.

Our carbon determinations are made from samples obtained by drilling the pigs, all other elements being obtained by drilling of chill cup samples. Since my attention has been called to this side of the question we have had time to make only a few determinations of carbon from chill cup samples, compared with pigs of the same cast, as follows:

	Sand pig.		Chill cup samples.	
	Cast No. 124.	Cast No. 132.	Cast No. 124.	Cast No. 132.
Graphitic carbon.....	3.40	3.59	3.55	3.64
Combined carbon.....	0.46	0.07	0.50	0.25
Total carbon.....	3.86	3.66	4.05	3.89

A distinction is to be made between iron run into chill molds, arranged in series corresponding to the beds of

sand, and iron cast in molds arranged on a casting table, the molds being filled by pouring from ladle car. The uniformity pertaining to the latter method, pig for pig, will not apply to the former, which are filled under the same conditions that apply to sand beds.

The Buffalo Steel Plant.

So thoroughly are the natural advantages of Buffalo as a steel manufacturing locality appreciated in the iron trade that quite a number of projects have been put forward in recent years to establish the industry there. It is only recently that a serious undertaking of this character was being developed, which was withdrawn, however, the projectors joining hands with the newcomers, at whose head is Walter Scranton of New York. The new plant which has the support of large transportation, steel and manufacturing interests, will be so important an addition to the billet and rail making capacity that we present the accompanying map to show its exact location. The capitalists interested have purchased at Stony Point, 4 miles from the City Hall at Buffalo, 1684 acres of land including the fringe now submerged to the harbor line. Our map indicates the extent of this property, for which large sums in the aggregate have been paid.

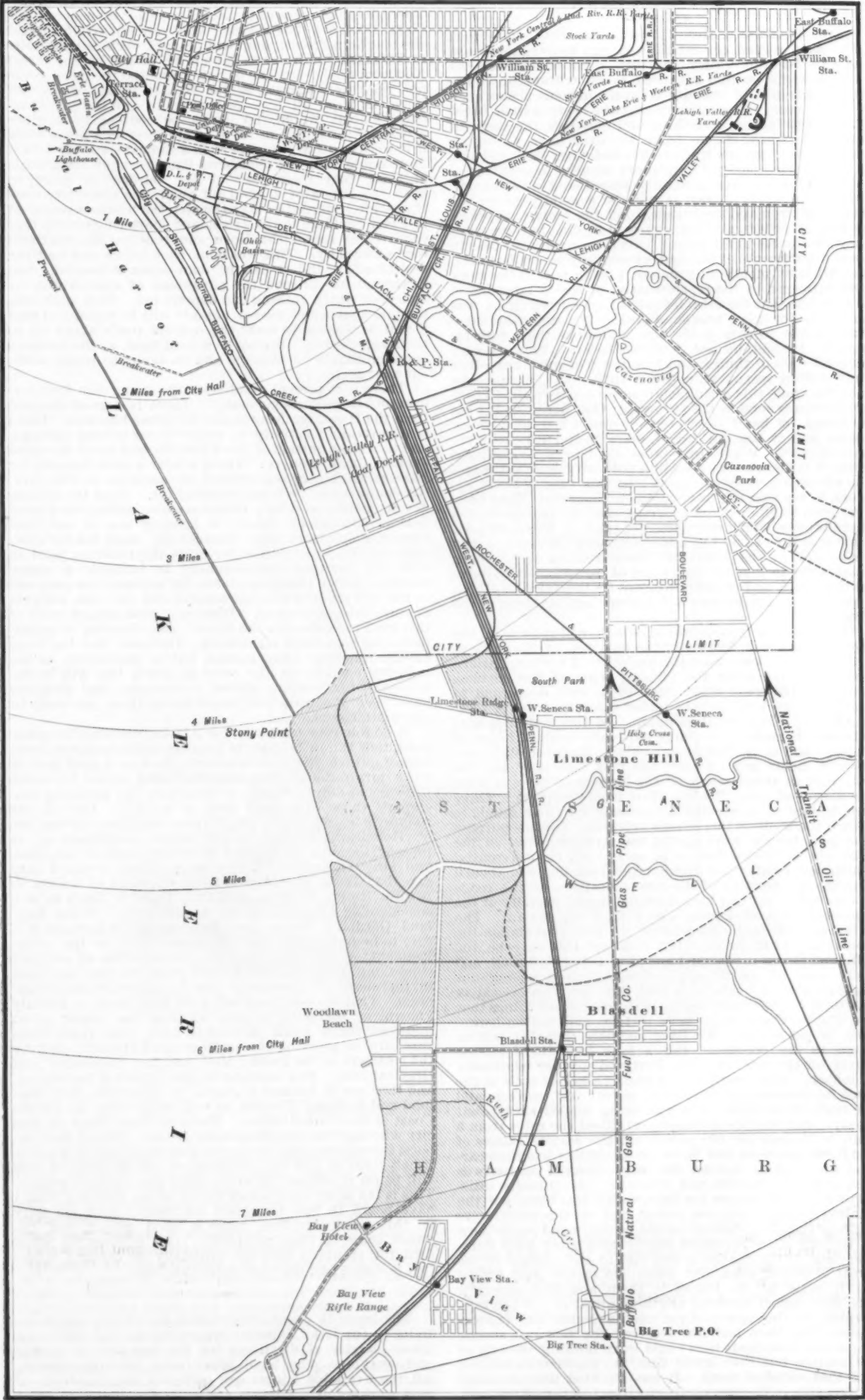
There has been recently incorporated by the parties in interest the South Buffalo Railroad, which, as shown, swings through the tract and connects beyond the Lehigh Valley docks with the Buffalo Creek Railroad, a link with all the Buffalo roads. In dotted lines we have also indicated the Terminal road, which also connects with the roads centering in the city. Along the tract pass, besides the Lake Shore, the Western New York & Pennsylvania and the Nickel Plate roads.

It will be observed that the tract has a water front along the lake of about 3 miles, and that it abuts also on Buffalo Harbor. Work is now being carried on by the United States Government on the breakwaters shown in the engraving. It is at this point that the unloading facilities for ore will be provided and the furnaces will be located. The steel works and rolling mills will stretch back of them parallel with the shore of the lake.

It is hardly necessary to refer more than briefly to the advantages of such a site in close proximity to Buffalo for the manufacture of steel. The materials can be very cheaply assembled, while the facilities for the distribution of product East and West, into Canada and for export to tidewater are exceptional.

The Bessemer Road.

At a meeting of the stockholders of the Pittsburgh, Bessemer & Lake Erie Railroad, held in Pittsburgh last week, it was decided to increase the capital stock \$2,000,000 and to issue a like amount in bonds. The creation of the new securities will entirely wipe out the floating debt of the company. The stock will be 6 per cent. cumulative preferred, and the stockholders are given the right to take one share for each five they hold of the present stock, which is neither classified as common nor preferred. The capital stock of the company has been \$10,000,000, and the funded debt \$11,000,000. Of the new bonds \$1,500,000 are to be issued, and the remainder are to remain in the treasury of the company to be used as needed. The bonds are to be 5 per cent. 20-year gold bonds. The company have been making great and costly improvements to the road, and the new securities are issued to extinguish the debt so caused. New docks are now being constructed at Conneaut, and the new Homestead docks now being built by the Union Railroad will be an improvement of importance to the Bessemer. The latter road is in excellent condition. The company operate a total of 227 miles of track. The entire line is laid with 100-pound steel rails, maximum grades are 30 feet to the mile, and 80 per cent. of the line is straight track. Fifty-one locomotives are in use and 2708 cars, most of the freight cars being steel hoppers of immense capacity. The Bessemer road managers anticipate a heavy ore movement this season. This is much earlier than was promised some time ago, although it is later than last year, when the first cargo was received about two weeks earlier. The programme for operation at the Conneaut docks of the road this season provides for night as well as day operation. Two shifts will be organized, so that the unloading of ore will go on continuously. Another feature that will insure dispatch to vessels is the building of steel ore bins on the west side of the river, in connection with the McMyler fast unloading plant. In case the car supply should not be sufficient to take all of a cargo direct, the vessel and the unloading machines will be moved along opposite the systems of bins and the balance of the cargo unloaded into the latter. From the bins it can be dropped into cars when the latter are available.



THE LOCATION OF THE BUFFALO STEEL PLANT.

Pacific Coast News.

SAN FRANCISCO, May 1, 1899.—We have had good rains since my last communication, and although down in the San Joaquin Valley and over most of the State the crops were far enough advanced to do without any more rain, it has been of undoubted benefit in some places, such as in the coast valleys, where matters were a little backward. But unless something untoward in the shape of hot north winds should come we shall have a bumper crop, such a one as we have not had since 1880, and this in a year when only a few short months ago universal failure of crops was generally feared and by some predicted. Needless to say it will be a good year for the hardware, iron and steel trade. All the houses are about as full of orders as they can well be, and in some cases they are unable to fill them. This is especially the case in some departments of the agricultural implement business, and without mentioning names I have within the week been informed by the representative of a very large house in that line that the establishment East for which he was an agent—for it is a branch of an Eastern establishment—was unable to ship goods here as fast as they were required. He had, he said, to refuse orders. This is a very unusual state of things, and I cannot remember any other time within recent years when such was the case. In fact, the trade this spring has done unusually well. There are instances such as the following: One house had, I am informed, on hand 10,000 tons of iron when the advance began, and it has got rid of every pound at heavily enhanced rates. What these rates may be can be imagined when it is known that a leading authority here estimates the advance at fully one third. In this case it is not too much to say that the hardwaremen deserve it. They have ever been in the van of progress, and no movement has there been in which they have not taken a foremost part. Such was the case in the fights for lower freights a few years ago, in the fight for lower freights to Northern coast ports, in that for their share of Government business on this coast, and in the movement for the union of all the Pacific Coast wholesalers and jobbers against those of the East.

There is now trouble ahead which will require all the tact and all the diplomacy of the best men of the trade to settle. It has long been the ambition of certain Eastern houses to take away the jobbing trade of the business people of the coast right from their very doors and to undersell the local houses under the very noses of their managers. They are at it again. In this matter special reference is made to one large hardware jobbing house of Chicago and to another large jobbing house of St. Louis. Now St. Louis and Chicago, the first especially, are the two most go-ahead cities of the East, or of the world for the matter of that. To this there is no exception. These two houses in particular have made up their minds to snatch the trade of this coast wholesale. For this purpose they have been at work among the representatives of the railroads to induce them to do away with the differential which now exists. An attempt had been made to abolish it at the last meeting of the representatives of the roads in this State, but had been defeated by the activity of the representatives of Pacific Coast trade in general. The Wholesale Grocers' Association of this city claims the lion's share of the work. But however this may be, the differential was increased instead of being abolished, and there was, of course, grave dissatisfaction among our Eastern friends. Now it is said they have succeeded in having it abolished entirely. It is this state of things that the Pacific Coast trade have to face, and the hardwaremen in particular. We have no doubt that they will be equal to the occasion. For a long time there was no safety for the San Francisco, Portland or other wholesaler or jobber. Any retailer could import a keg of nails at the same figure as a merchant could import ten carloads and the trade of our merchants was being sapped slowly but surely. But the new arrangement raised the rates from 5 cents to 40 cents per 100 pounds on the various classes of freight to points in this State on quantities less than carload lots, and as this on the whole favored the roads as well as the wholesalers and jobbers it was mutually satisfactory. Furthermore the lines within this State got the hauling back to interior points, and on the whole were desirous that the business should be continued on the new basis; that is, the Southern Pacific and other lines were. The cause of the change is now laid to the account of the Great Northern road, but when the matter first leaked out it could not be traced to them, and their agents in this city denied knowing anything about it. When telegraphed to the agents of the road in Seattle and Tacoma replied that they had not received the new rate sheets, and so the merchants here could learn nothing directly of the matter, but they knew that the goods were coming and that satisfied them. It was reported that members of the trade in the two northern cities mentioned had supported the action of the Great Northern, or, rather, asked for it. But this was improbable, inasmuch as it would have injured themselves. Quite a number of meetings of

the trade have been held here—the last one on Saturday. There does not seem to be much hope of influencing the Great Northern, but the men who were not afraid to fight the Southern Pacific, and who fought them successfully in the matter of freights, cannot be defied by the Great Northern road. Outside of San Francisco the latter could not very well operate, as the freight inland would cut them off from all hope of that trade, and the San Francisco jobbers would, no doubt, be content to sacrifice profits for a while in order to retain their own home trade if it were necessary to take such a radical step. It is not improbable that the Southern Pacific would, for a while at least, bear their part of the burden in order to keep the hands of a rival off their own home territory. If absolutely forced to take the step the business people of this city could go to the extreme of chartering vessels that could come round the Horn and beat out the Northern road effectually. This was done once before and had the desired effect, and it can be done again if needful. San Francisco has always the advantage of competition by water, of which nothing can deprive her. It is probable, though, that some *modus vivendi* will be found and that it will be possible to make the outside roads stand up to their agreements. It may be a hard fight, as the business is too profitable for Chicago and St. Louis to resign without a struggle.

There is at present great activity among our foundrymen and machinists generally. There is a great demand from the Hawaiian Islands also for home business. There is a revival of activity in many of our mining sections, and in Alaska outside of the Klondike, and there is a good demand for machinery. There is also a good demand for Eastern machinery represented by agencies in this city. Air compressors are being inquired for. Then the mining developments on Unga Island are also calling for a good deal of machinery, which is keeping one of our local foundries busy just now. Besides the work for the Government, &c., going on at the great shipbuilding yard in this city another establishment is building a steam launch. Large pumping plants for reclamation purposes in the tule lands of the Sacramento and the San Joaquin are also being got ready. There is a good deal of work of this kind to be done in the State. One foundry is manufacturing beet sugar machinery. Hitherto this has been mostly imported from abroad, but in proportion as the industry extends on the coast so much less will be the necessity for sending abroad. Germany and Belgium have been the principal beneficiaries from our needs in this matter in the past.

A double rope tramway for Alaska is among the other work that is now helping to keep our manufacturers busy. One of our leading establishments has done a good deal of work during the year in manufacturing cables for street railways in different parts of the coast. In pumping machinery there is a good deal of activity. One of our foundries is preparing a \$60,000 pumping plant for the city of Honolulu. Eastern water wheel machinery is at present, too, in good demand in various parts of the coast, and also for export. Referring to export trade, I may say that there has been a large shipment of boilers to Asiatic Russia recently, and that there is likely to be a considerable demand from all Asiatic ports. When England, Germany, France and Belgium get a foothold it is sure to be followed at no very distant date by the establishment of industries and the introduction of civilized conditions of life, and the nearest point whence anything in the shape of machinery can be supplied is San Francisco. That we make and sell good machinery is already known, or becoming known, all over the Orient, as at different times small shipments have been made from this city to most of the ports reached from this city by the steamers of the Pacific Mail and the Occidental and Oriental lines. Our business in gas engines is increasing, and they are in demand in Japan, in Australia, New Zealand and British Columbia, as well as all over the Pacific Coast of the United States. There are four firms in this city who manufacture them more or less. One of these reports a steady increase every year since they were first established—that of 1898 was far ahead of 1897 and that of 1899 will be far in advance of every other year in the business. This is the most satisfactory report of an industry that I have heard in San Francisco for years. And not only do this particular firm make a good report, but the others share in their prosperity. Gas engines are much used for pumping and are especially in demand where fuel is scarce and dear and wages are high. J. O. L.

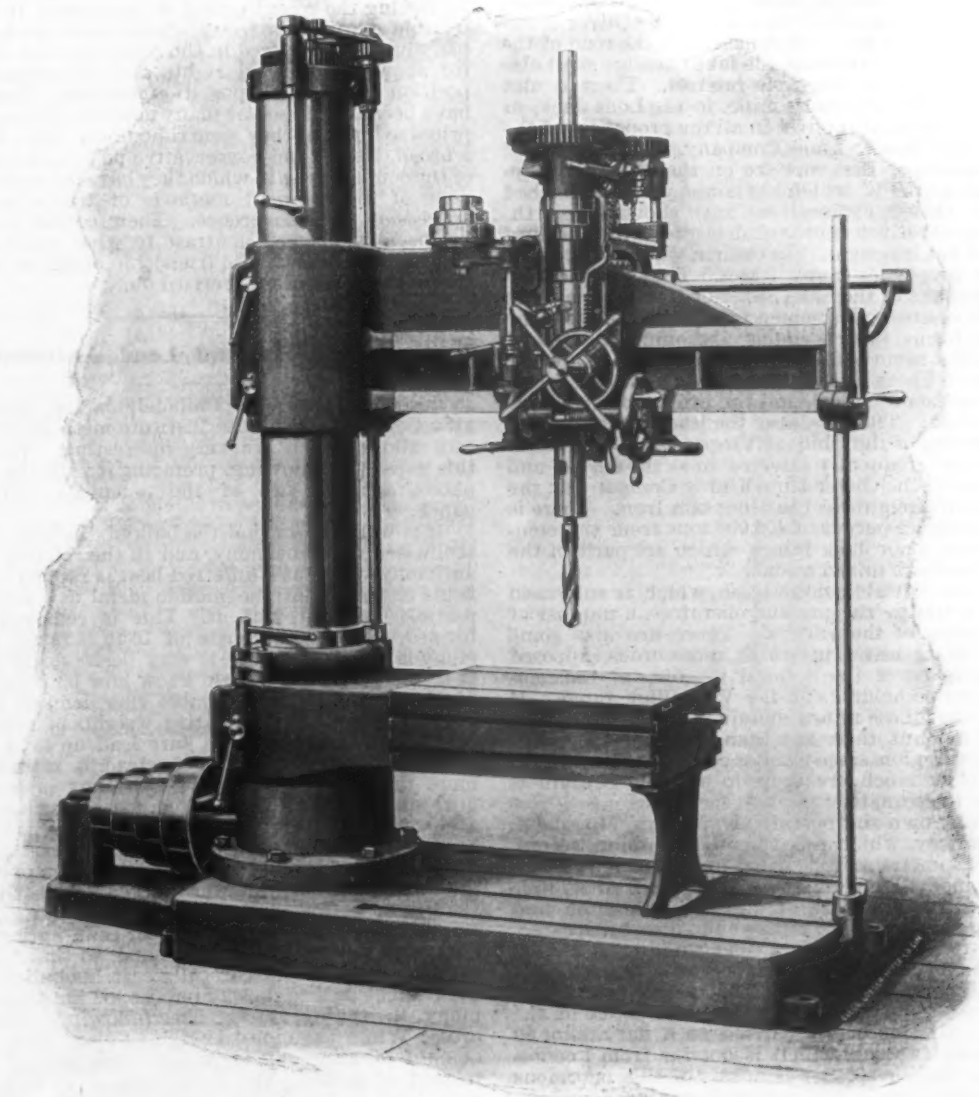
The boom in copper has caused such a revival of activity in the Lake Superior copper region that there is a great scarcity of dwellings for the numbers of miners and workmen who have lately gone into the district. All the available houses are occupied and hundreds of men working at the mines and mills are unable to bring their families there for lack of a roof to shelter them. Preparations are being made for the building of modern tenement flats at Houghton and other points on the lake.

The Cincinnati Radial Drill.

The column of the improved drill built by the Cincinnati Radial Drill Company of Cincinnati is mounted on a heavy ribbed base, which carries the outside column on anti-friction rollers, the latter being supported concentrically with the other. A V shaped bored ring surrounds both columns at the lower joint, and by a partial turn of an eccentric lever both are clamped rigidly together, making a very solid connection. The table swings on the column, and is supported at the outer end by a brace resting on the base. The arm is elevated and lowered with power by means of a screw running on ball bearings. The head has a long bearing, is moved on the rail by a hand wheel and compound gearing running on rack, thus allowing a quick adjustment and hand wheel close to the operator. The spindle is back geared and bored to fit

The Proposed Gas Fixture Combination.

The gas and electric light fixture combination, which has been in hand for the past four months, is said to be nearing completion. The promoters announce that the future of the scheme will be definitely decided within a very few days, and intimate a strong probability that it will go through. Options are said to have been secured on the plants of the following concerns: The Mitchell-Vance Company, Cassidy & Sons Mfg. Company, L. Plaut & Co., Archer & Pancoast Company, W. C. Vosburgh Mfg. Company, J. B. McCoy & Son, Oxley & Enos Mfg. Company, New York and Brooklyn; Horn & Brennen Mfg. Company, Thackara Mfg. Company and the Gibson Gas Fixture Company of Philadelphia; Cleveland Gas Fixture Company, Cleveland; D. J. Braun Mfg.



THE CINCINNATI RADIAL DRILL.

No. 4 Morse taper. It has quick return, three variable feeds, automatic stop, and its thrust bearing is on anti-friction rollers. All operating levers and hand wheels—viz., for automatic feed, quick return handles, locking handle for head, stopping, starting and reversing levers—are within easy reach of operator. The spindle sleeve is graduated and provided for an automatic throw out. The back gears, having a ratio of 1 to 5, can be thrown out and in when running. They are located directly on the spindle, bringing the power close to the work and relieving transmitting shafts and gears from undue strains. A reversing gear is provided for tapping automatically or by hand; the machine starts backing out slowly, and if desired can be reversed five times as fast as it is started. A detachable brace is provided at the outer end of the arm to prevent springing the base, column and arm, which is a desirable feature. The machine drills to the center of a circle of 90 inches, and receives under the spindle over the base 4 feet 5 inches, and over the floor 4 feet 11 inches. The traverse of the spindle is 14 inches.

Company and W. S. Edwards & Co., Chicago, and Thos. Day & Co., Limited, San Francisco.

A law recently passed in Natal, South Africa, imposes a tax of \$48.66 on commercial travelers. If a traveler is found without a license he is liable to prosecution and a fine for each offense equal to four times the amount of the license, or to imprisonment for a period not exceeding three months.

The payment, on the anniversary of the battle of Manila Bay, to M. Cambon, the French Ambassador at Washington, of the \$20,000,000 indemnity paid by the United States to Spain for the Philippine Islands, marks the final official act in the negotiations connected with the Spanish War of 1898.

The Rockefeller Ore Interests.

The property in the iron ranges of Northern Minnesota in which John D. Rockefeller is interested consists of mines, a railway and the largest fleet of steel ships on the Great Lakes. The entire property has been brought to the highest pitch of efficiency and earning capacity by the wise management of the various officials at Duluth and New York, supplemented by sufficient money at call for all legitimate requirements, and for the deliberate carrying out of a policy that has looked far to the future, and has foreseen many contingencies that the general public, or the ordinary iron mine operator, has not realized.

The mines of this great property include the absolute ownership, in fee simple, of these properties, many of them noted wherever iron is mined: Mountain Iron and Aetna adjoining it; the Mountain Iron is leased to the Oliver Iron Mining Company at a royalty of 25 cents a ton and an annual output of not under 400,000 tons. Coupled with the lease is a contract that all ore mined from the property during the 50 years of the Oliver leasehold shall be carried to Lake Superior on the road of the Rockefeller company, and that the lake carriage shall also be on ships provided by the same interest. There is also held the fee to the Pillsbury mine, to the Lone Jack, to the Duluth, to one-half interest in all the properties of the Rouchelleau-Ray Iron & Land Company, including one of the finest deposits of Bessemer ore on the Mesaba in Section 17, Township 58-17, which has not as yet been touched by the miner, though explorations have shown its worth, and also some other yet unopened deposits of ore, most of them bought not long ago. The company have in addition to these fee properties many leases. These include the very large deposits of the Lake Superior Iron Company, at Hibbing, whose ores are to some extent a part of the same deposit that forms the enormous Mahoning mine, and there are in the same locality the leases for the Day and Sellers mines. These various leases range from 25 to 80 cents a ton on the ore mined, and the ore is chemically of a very fine grade. There is also the lease of the Adams mine, at Eveleth; of the Ohio, at Virginia; of the Missabe Mountain, more frequently referred to as the Oliver, and under sublease to the Oliver Iron Mining Company on the same terms as to freights as the Mountain Iron. There is an annual minimum output of 400,000 tons from the combined Oliver and Lone Jack mines, which are parts of the same deposit and are mined as one.

There is the Biwabik mine lease, which is subleased at 10 cents a ton to the present operators, a number of furnace concerns of the valleys. There are also some undeveloped State leases in which more ore is supposed to exist. These cover the mineral interests of the company, who have no holdings on the Vermillion range. It is safe to say that these mines contain more ore, by a very considerable amount, than has been mined in the entire Lake Superior region since mining commenced nearly 50 years ago. How much ore they do actually contain it would be idle to estimate.

The company own and operate the Duluth, Missabe & Northern Railway, which has 197 miles of main, second and mine and spur trackage. It has an equipment of 2700 ore cars, all modern and most of them of 27 gross tons capacity, a full equipment of passenger, freight and logging rolling stock and 35 heavy and powerful locomotives of late design. Over this road there were hauled last year a traffic greater, per ton per mile, than that of any road in America, bar none. This year the traffic is expected to be not far from 1,000,000 tons in excess of the past season. All this ore is carried at a flat rate of 80 cents from mine to dock, which is not far from 1 cent a ton per mile. For the proper handling of this enormous traffic there are very costly and well equipped and arranged docks, yards and other terminals. The two docks of the company, situated on the harbor of Duluth, and available for ships drawing 20 feet of water, enjoy the distinction of leading the world in size. Each is 2336 feet long, with pockets enough for the storage of 120,000 tons of ore, and an annual shipping capacity of about 3,000,000 tons. These docks alone represent an investment of not far from \$800,000. They are approached by steel elevated roadways, double tracked, and all the bridges on the line are now, or will be this season, of plate girders of a standard of construction the very highest.

The Bessemer Steamship Company own and operate a fleet of 22 steel ships of the largest class, some of them capable of carrying 7000 to 7500 gross tons at a load on the ordinary draft of water in the connecting channels of the lakes. The record breaking cargoes for last year on Lake Superior were carried by these ships, in both steam and sail vessels. Of the fleet of steamers there were built to the order of the company the "Morse," "Bessemer," "Siemens," "Stephenson," "Watt," "Fairbairn," "Fulton," "Ericsson," while the "Neilson," "Cort" and "Globe," the latter to be renamed, were acquired by purchase. There are also ten large steel consortships to be towed by steamers, and it is the intention of the company to this year move 20,000 gross tons of iron ore by one

engine, and in three ships. This will be an unprecedented record, and like many other things that these several Rockefeller companies are quietly and frequently doing, could not be accomplished if there were not the highest executive ability in the various positions of trust at Duluth, New York and Cleveland. Besides the 22 ships now afloat the company will in a few days launch two more, one a steamer and one a barge, both of the largest size, and have let contracts for four more for delivery in April, 1900. The entire fleet will have capacity for moving, one way only, not far from 3,500,000 tons of freight, and they will do this in the short lake season of seven to eight months.

The Lake Superior Consolidated Iron Mines, the company controlling all these interests except those of the steamships, are capitalized at \$30,000,000, and have issued about \$28,000,000 of this. They have no debt, and none of their constituent companies have liabilities except the Duluth, Missabe & Northern road with its bonded obligations.

During the recent period of depression in trade and of terrible stress in the iron and associated markets this company have not faltered in the steady pursuit of their plans for acquiring mineral rights and for strengthening the position of their transportation interests. They are said to have been able to secure many millions of tons of iron ore at prices so low that they seem ridiculous. They have pursued a broad, liberal and conservative policy, and in the affairs of the communities in which they have interests have shown none of the frequent methods of trusts or capitalistic oppression or interference. Their course in this regard has been in marked contrast to what many had feared, and has gained them the friendship of all the communities where their business is carried on.

Testing Lead Tin and Lead Antimony Alloys.

Joseph Richards of Philadelphia has brought to the attention of the Franklin Institute methods of testing certain alloys which are very interesting. We quote from this paper the following, prefacing it with the remark that photographs of two of the machines accompany the paper:

It is well known that the bulk of the lead ores are contaminated with antimony, and in the refining of lead the antimony when at a dull red heat is rapidly oxidized and floats on the top of the molten metal as a scum, carrying particles of lead with it. This is removed as fast as formed, and in the course of 10 to 48 hours all the antimony is eliminated. It is very desirable in this process that the workman should know how he is progressing in his work; and in order to meet this demand I have made a series of tests of the relative weights of standard alloys of antimony and lead from pure lead up to 24 per cent. of antimony. At this point the lead is saturated, and if more than that quantity of antimony is present it will float on the top of the molten mass; so that a standard alloy of 24 per cent. of antimony is the highest that can be tested by my apparatus. I made castings of these alloys in a mold, took the average weight of ten of each grade, and the machine was marked to exactly balance at the line or weight given by the average test. This I continued from pure lead up to 24 per cent. antimony; thus a quick and reliable means is at hand, so that all the workman has to do is to carefully cast his bullet, place it on the balance, and it shows him at once the amount of antimony in the mixture. The following difficulty here arose: While antimony is lighter than lead, if a small amount of antimony is present (less than 2 per cent.), instead of making the bullet lighter, it is heavier than pure lead, and it is not until over 2 per cent. is present that its weight becomes less than that of lead. This difficulty I overcame by discovering that the physical properties of these alloys is such that if a small button is poured on a flat plate and allowed to cool, the surface is not at all like lead, but of a fine white crystalline appearance. So I have supplemented my test machine with a set of buttons of a known composition from 2 per cent. down to zero, changing composition by 1-10 per cent. in each button. I made the first button 2, the next 1-10 per cent., and so on down to pure lead.

Thus the operator can go on with his work until there is a perfectly lustrous surface, free from frost, and at this point the lead will be 998 fine or over. The practical value of these tests is shown by the fact that since I made the first machine for the National Lead Company their order has been duplicated six times.

Another method of quick testing was needed for the alloys of lead and tin. When I commenced this business the only way I could find out the percentage of tin in solder, solder joints, pewter and such like metals, of which we were buying hundreds of tons each year, was by chemical analysis, and I found this took several hours and required great care and much practice to get accurate results. The use of the specific gravity test was suggested to the writer by an old member of the Institute, G. H.

Perkins, but the means employed were crude and unsatisfactory. So I again commenced with pure lead as a standard, taking 99 of lead to 1 of tin, and so on till I got up to pure tin. I made over 2000 tests, confirmed them by analyses of the metals used, and so made a set of standard weights, from which standards the scale now before you was marked, each mark being the average of about 20 tests, and is correct to the tenth of 1 per cent. I may here remark that the weight of these alloy bullets is, for some physical reason, different from the calculated specific gravities of the alloys, some being heavier and some lighter than the calculated weights. The machine before you has a graded beam, and the molds are all made to an exact standard and are all interchangeable. If a firm lose or break a part of the machine it can be easily replaced or a new mold procured. So that now, when we melt alloys of tin and lead, we do not even have to depend on accurate weighing of the metals to be melted, but test each pot and can check any error that the workman might have made in his weighing. So accurate is this test that a difference of a quarter of 1 per cent. is easily detected, and my experience in my own laboratory and with samples sent to a number of good chemists is that I would every time prefer my test for practical purposes to that of the ordinary chemical laboratory.

When we consider that many thousands of tons, roughly estimated at 75,000 of solder alone, are used in the arts every year, one may easily perceive how valuable a factor to the trade such a machine as this becomes, and it has been so recognized, for at this time at least nine-tenths of all the smelting and refining works in the United States are using my machine. Also in the new industry of manufacturing roofing plates with tin and lead alloy coating, called terne plates, I find that I have supplied three-fourths of the plants with these machines; so that they may test and keep regular the proper percentage of tin and lead in their bath. Many large purchasers of solder find such a testing machine indispensable to protect themselves from lower grade metals than they pay for. This simple, accurate and altogether satisfactory method of testing is therefore now in common use.

In my machine for testing roofing plates the beam is so adjusted that a piece of the sample plate exactly cut to template size and then weighed on the scale gives the weight of a box of 20 x 28 plates in pounds. For instance, if the plate cut shows a weight of 220 pounds that is the weight a box of plate would be with the coating on it. This piece of plate is then heated over a Bunsen burner till the coating melts, then wiped clean, heated again and wiped till no more metal is on the surface. When the surface is blue all over, showing that all the coating is removed, weigh it again. If it now weighs 200 pounds this will be the weight of the black plate per box, and the difference between the two weighings is the weight of the coating in pounds.

The Sweetland Reversible Scroll Chuck Jaws.

One of the solid reversible geared scroll chuck jaws made by the Hoggson & Pettis Mfg. Company of New Haven, Conn., is here illustrated. The form of the jaw



THE SWEETLAND REVERSIBLE CHUCK JAW.

and particularly of the teeth is clearly shown in the engraving. Making the jaws solid is a guarantee that the strength is not impaired. Accuracy is insured from the fact that the jaws are ground true in each chuck.

The National Protective Association of Tin Plate Workers, in session at Columbus, Ohio, last week, adjourned on May 5, having adopted a wage scale which was not made public. The headquarters of the organization will be at Elwood, Ind., and the next conference will be held in Pittsburgh. Hugh J. Scanlon of Pittsburgh was elected delegate to the American Federation of Labor and commissioned organizer for the tin plate craft. These officers were elected. George Powell, New Castle, Pa., president; J. F. Berry, Elwood, Ind., secretary-treasurer;

W. O. Moore, Elwood, Ind.; John Roombolt, Ellwood City, Pa.; Hugh J. Scanlon, Pittsburgh; A. L. Harris, Wheeling, W. Va., vice-presidents. A. Q. Wilson, Martin's Ferry, Ohio, is a member of the Executive Committee.

The St. Louis Tapping Machine.

The mechanism of the tapping machine, here shown, consists essentially of three bevel gears. The power is imparted to the upper gear from the belt through the cone mounted on the same spindle as the bevel gear. This



THE ST. LOUIS TAPPING MACHINE.

provides a direct pull on the tap, which is driven from the upper spindle. The intermediate gear is simply mounted on a stud. The lower gear is mounted on a vertical shaft, which passes down through the frame to which the tap chuck is attached. This lower vertical shaft has a clutch on its upper end, between the bottom and top gears, and these gears in turn are provided with a clutch on each. When the work is pressed up against the tap it forces the tap and the shaft to which it is attached upward, engaging the clutch with that in the upper gear. When the table is released it draws the work down, and the clutch immediately disengages with the clutch in the upper gear and engages with that in the lower gear, thereby reversing the tap. The table is actuated by the treadle, leaving both hands free at all times to handle the work. One marked advantage of the vertical tapping machine is that there is a platen provided for receiving the work, which rests firmly, insuring better tapping at a much less liability of breaking taps. This tool is made by the St. Louis Machine Tool Company of St. Louis, Mo.

The Chancellor of the Exchequer announced in the British House of Commons that the Government was unable to accept Cecil Rhodes' proposals in regard to the proposed Cape-to-Cairo Railway.

Investigations of Boiler Explosions.*

BY GUS C. HENNING, NEW YORK.

In spite of the numerous boiler explosions constantly occurring in all kinds of service, and the numerous investigations of their causes which have been made officially and otherwise, no general method has thus far been proposed which gives any certainty of reliability of conclusions.

The well-known boiler tests made by a Government board of the United States, at Sandy Hook, gave only negative results, and were of little practical value.

This seems very strange, more especially when it is considered that the fundamental causes are very limited in number. They are:

- Excessive pressure.
- Defective material.
- Low water.
- Defective workmanship.
- Local defects.

Excessive Pressure.

Excessive pressure can be produced by willfulness or by careless operation; it can be controlled by autographic recording gauges, alarm whistles and competent management.

Defective Material.

Defective material can be readily avoided, and should never be used in any case; it is criminal to use it.

Low Water.

Low water may be the result not only of carelessness, but of many accidental causes, such as derangement of pumps or injectors, stoppage of pipes, gauge glasses, valves, &c., or even by suddenly augmented leakage, which cannot always be discovered promptly, or even immediately provided for after discovery.

Defective Workmanship.

Defective workmanship exists more or less in all boilers, except those which are built without calked seams and rivets, and punched holes, and all parts of which are prepared and finished by machine tools and consist mainly of tubes with screwed ends. Defective workmanship develops greater or less defects during service and necessitates constant repair and patching, and may be cause of material weakness in course of time.

Local Defects.

Local defects may exist in all boilers initially or develop after a while in service.

Determination of Excessive Pressure.

Assuming that a boiler has been properly designed, there will be no excessive pressure in service except as previously stated. If all the possible safeguards have not been employed and a record of pressures has not been made, it is still possible to obtain such record for the instant of explosion by making several tests of strips, especially when cut from material of different thicknesses taken from the boiler.

It is a well-known fact that all material used in construction is subjected to stress about one-third of its yield point, but never beyond one-half of this amount. Stress sufficient to cause rupture is always about five times the working stress. If, then, any part of the boiler had been worn thin by corrosion, such material would be overstressed and overstrained.

It is also a well-known fact that excess of stress beyond the yield point invariably raises it above its original value, and if, therefore, careful tests be made of the material, especially with an autographic recorder, the results will invariably show augmentation of yield point. Different thicknesses will show different augmentations, which must always be in direct proportion to the stress applied. If calculations show that the augmentations of yield point in thick and thin material were produced by the same internal pressure, then it is proof positive that excessive pressure existed at the instant of explosion, and also its exact amount. Tests of stay bolts will show the same thing. Elongation of the material is, however, reduced by excess of stress, and a second tension test of a piece of material previously ruptured will be very materially decreased. Stress beyond the yield point also changes the shape of the elastic curve in a very characteristic manner.

Determination of Defective Material.

As it is assumed that all material used in the boiler originally was of good quality, it is only necessary to discuss the changes which might have taken place while in service. It is also assumed that all parts of the boiler are open to inspection at all times, and that, therefore, any local corrosion will be discovered at once and carefully

watched during its progress. Ocular inspection is always sufficient for this purpose, and such defects are always visible and easily recognizable before and after failure, and the latter can only occur under the most careless supervision. In service, material may, however, deteriorate by the action of repetitive stress, the effect of which is again clearly indicated by the results of tests, and more particularly by carefully drawn diagrams. The yield point will again be changed as before, and the elongation similarly. However, different parts of the boiler would show different effects according to their location, and the different action which each is subjected to would produce different results of tests. In the case of excessive stress the differences would be the same in all material in the boiler. Moreover, a careful study of the results will show other differences which are most fully described in the reference given. These changes of material are, however, produced only by such an immense number of repetitions of stress that they are rarely produced in boilers, which generally wear out and are replaced by new ones before they become distinctly developed.

Long continued service of material in contact with fire and gases of combustion also produces very marked changes in structure and properties of the materials. The structure becomes more crystalline and brittle. It loses much of its ductility. While the yield point and tensile strength are not much changed, the former generally being lowered, the elongation is decreased materially. Bending tests on both cold and quenched material show considerable deterioration. Nickel bending tests especially produce striking differences. As different parts of the material are affected differently because of difference in temperatures of the fire, they will show different qualities in material and in proportion to these temperatures. This being the case, the cause of such deterioration can be easily traced by careful tests; it is, however, essential that complete records of tests be obtained, which is, of course, possible only by autographic records. It does not suffice to make the usual determinations of ordinary tests.

It has never been demonstrated that boiler plate, other than that subjected to the action of fire and hot gases, has had its properties changed by long continued service.

Low Water.

Low water, however caused, always produces excessive heating, and if the temperature rises sufficiently to weaken the material failure may occur by stripping of the stay-bolts or rupture of the sheets by bulging between them, or otherwise. If the temperature has raised the material to a low or bright red color this can be readily determined by superficial inspection. While the fire side will show red rust or a black color the water or steam side will invariably show a typical steel blue scale, which will not disappear even after years, as it is a so-called rustless coating. If this be once oiled it will always be distinguishable, even if the plates had been exposed to moisture and gases for years. The color of this scale will depend somewhat upon the temperature at which it is produced, being brightest at those points where temperature was the highest. Carefully made tests with autographic diagrams of such material will again demonstrate changes of properties which are very characteristic. The yield point will be found very low, while the diagram will show a material drop of curve just after the yield point. The elongation will, however, as a rule, be materially increased, with a diminution of tenacity. Nicked and quenched bending tests will again show marked differences between strips cut from the sheets at points which in one case were overheated or were above the low water line, and in the other were taken from a part below this line. The fracture will also be materially different. To demonstrate the temperature at which the plates happened to be at the instant of explosion it is necessary to cut strips from points of the overheated plate below the water line. These strips, polished on the edges, are then held in a clear fire so that one end remains cold while the other is heated to a dull yellow or a very bright red. This temperature being reached the bars are withdrawn, and while one is rapidly plunged with one end into a pot of boiling water the other is allowed to cool in air, but not in contact with wet material or metal or stone. When the piece which had been immersed in boiling water about 1 inch deep has become nearly cold, below blue heat, it is plunged into cold water.

On the polished edges of both bars will be found scale and heat colors, the temperatures producing them being well established. These bars are then carefully nicked at points opposite every change of color and then broken off at these nicks. By comparing these fractures and their scale and colors with those obtained from pieces cut from the overheated plates, the temperature at which they were at the instant of explosion can be determined with great accuracy. Having thus determined the temperature at which the sheets were during operation, it is also known whether the metal was sufficiently soft to bulge or to strip from the stay bolts; examination of plates and bolts will verify the conclusion.

* Paper presented at the Washington meeting of the American Society of Mechanical Engineers.

Defective Workmanship and Local Defects.

As these must be of very grave importance when sufficiently serious to produce boiler explosions, and are readily noticeable to any trained eye, it is not necessary to discuss them at length; they have often been studied and described. The literature on these subjects is so ample that their enumeration may be omitted.

From the foregoing explanations it will be seen that careful testing with proper means and apparatus, added to thorough superficial inspection, will always be sufficient to demonstrate the cause of any boiler explosion. It is the failure to apply correct knowledge in individual cases that has led to the frequent conclusion of "cause unknown" or "no reason for accident." The failure of eminent engineers to reach definite results is due entirely to inadequate investigations which did not discover the facts available. Moreover, the tests of the material after explosion were made in such a superficial manner, and with such inadequate methods, apparatus and care, that they were generally valueless.

In my experience I have repeatedly found the results of tests of so striking a nature that this, taken in connection with the knowledge of original properties of the material, gave convincing proof of the causes of explosions. This is not only true of sheets, but also of flues, both of which I have had repeated occasions to study carefully, and there does not seem to exist any doubt whatever that the cause of every boiler explosion can be readily determined with simple means readily obtainable, by one who has correct and sufficient knowledge of properties of materials as affected by different conditions.

THE WEEK.

A bill passed by the Pennsylvania Legislature and signed last week by Governor Stone relieves all Pennsylvania corporations of the limitations heretofore imposed by the laws of the State as to the amount of capital stock. The bill, however, provides for the payment of a uniform tax, amounting to one-third of one per cent., on the authorized capital stock of all companies, except building and loan associations, before they get their charters.

In his speech at the opening of the Transvaal Volksraad, the other day, President Krüger claimed that the Transvaal was now the largest gold producing country in the world. He said that the output in 1898 was \$77,955,000, being an increase of \$21,817,160 over the output of the previous year.

The Inland Navigation Company of Canada, who have just made application to the Canadian Parliament for a charter, with a capital of \$4,000,000, propose to build 10 steel barges, capable of carrying 80,000 bushels of wheat each through the canals, and to establish adequate terminal facilities and grain elevators at Port Colborne, Montreal and Quebec. They expect to be able to divert a large portion of the traffic which now comes through Buffalo to New York to the St. Lawrence route.

A new boat propelled by a carbonic acid gas engine, which has been built at Kingston, N. Y., will shortly be tested on the Hudson River by a board of naval officers.

Another order for locomotives for England has been placed with the Baldwin Locomotive Works, Philadelphia. The present order is for 20 engines for the Great Central Railway, to be used for hauling heavy freight trains.

The fire loss of the United States and Canada in April aggregated, according to the *New York Journal of Commerce*, \$9,213,000, a drop of nearly \$2,300,000 from the March figures, but an increase of \$1,000,000 over the losses in April, 1898. The total fire loss for the first four months of this year was \$49,893,000, as compared with \$37,958,000 in the corresponding period of 1898. This increase is a serious matter for the fire underwriters, and it is pretty certain that 1899 will be a bad year for them.

At a meeting of the Brotherhood of Locomotive Engineers, held a few days ago in Norfolk, Va., Grand Chief Arthur declared that the day of strikes was past, and with it the day of hot headed officials, whose refusal to submit to arbitration vexed questions had caused the only strikes ever declared by the Brotherhood.

The Peruvian Government has invited tenders for building a road from Oroya to Cerro.

A coal barge of novel design is being constructed at the shipyards of Lewis Nixon, Elizabethport, N. J. The barge will be used by the United States Government, and will load coal on steamers, either at their wharves or on the open sea, by a system of endless chains, the coal being carried in huge buckets and weighed in transit to or from the vessel. The barge is 150 feet long, and

has a draft of 10 feet when loaded. She is 30 feet beam, and is built entirely of steel. The hull is of unusual strength, and will carry 1000 tons of coal.

A frightful tornado swept through Kirksville, Mo., and Newtown and Ute, Iowa, on the 27th ult., causing over 100 deaths and destroying a great deal of property.

The Marsden Cellulose Company, who operate factories at Rockford, Ill., and Owensburg, Ky., have decided to locate a large plant at Newport News, Va., and to make that place the headquarters for all of their trade in this country and abroad. The Marsden Company have contracts to furnish the battle ships "Kearsarge," "Kentucky," "Illinois," "Alabama" and "Wisconsin" with corn pith cellulose for coffer dams. They will also furnish feed for the cattle, sheep and hogs used in the large new abattoir to be erected at Newport News.

To Manufacture Gruson Turrets.

The Gruson Iron Works of New York City were incorporated on May 8, with a capital of \$500,000 and the privilege to increase to \$2,000,000, and empowered "to manufacture chilled iron armor, gun carriages, cast iron turrets, casemates and chilled and unchilled castings of iron and steel." The object of the new company is to manufacture Gruson turrets for coast defense, for which they have secured the sole rights in the United States. These turrets have been made heretofore exclusively at Magdeburg, Germany, by Fried. Krupp Grusonwerk. The Gruson turrets are made of chilled charcoal iron of the best quality; they are circular in form, with curved tops, and can be revolved by means of interior mechanism. The construction is of the most substantial character, in order to permit the use of the heaviest guns within the turrets and to enable them to resist successfully any fire that can be concentrated upon them. The sectional plates of which they are composed weigh from 60 to 90 tons each, and have a chilled or hardened surface, 2 to 3 inches in depth. It is said to be the intention of the United States Government to mount the 16-inch guns now building for coast defense in these turrets, the first of which will be placed on or near Romer Shoal, in New York Bay.

The directors named in the certificate of incorporation are P. H. Griffin of the P. H. Griffin Machine Works, Buffalo; Thomas Prosser, representative of Fried. Krupp Grusonwerk for the United States, this city; C. W. Barnum of Barnum & Richardson, Lime Rock, Conn.; T. Guilford Smith, vice-president of the New York Car Wheel Works, Buffalo; A. E. Piorkowski, captain I. G. A., representative of Fried. Krupp Grusonwerk in Magdeburg, Germany; Ernst Thalmann of Ladenburg, Thalmann & Co., New York; David Townsend of Philadelphia; S. Singer, Paris, France, and Herbert L. Satterlee of Ward, Hayden & Satterlee, New York.

A Busy Shipyard.

The big shipyard of the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., is at present a theater of remarkable activity. The shipbuilding contracts now in hand aggregate in value \$18,580,000, embracing a total tonnage of 115,035. Between 5000 and 6000 men are on the company's pay rolls. Among the vessels now building at Newport News are the battle ship "Kearsarge," 11,525 tons; battle ship "Kentucky," 11,525 tons; battle ship "Illinois," 11,525 tons; battle ship "Missouri," 12,500 tons; monitor "Arkansas," 3000 tons; four large Morgan Line steamships, total 18,640 tons; two large Cromwell Line passenger and freight steamships, same tonnage as Morgan ships, total 9320 tons, and two large Pacific Mail passenger steamships, each having a tonnage of 18,500. In addition, the repair work in hand at the yard aggregates several hundred thousand dollars.

Information Wanted.—We have an inquiry requesting the name of the builder of "Cornell" lathes.

Who produces machines for manufacturing door hinges?

The address is requested of makers of special machinery for forging and turning axles.

Who produces machinery for making shovels and shovel handles?

Thomas J. Shaffer, president of the Amalgamated Association of Pittsburgh, has announced the names of the committees he has appointed to compile the new wage scales to be adopted at the convention of the organization, which meets in Detroit, Mich., on Tuesday, May 16.

The Iron Age.

New York, Thursday, May 11, 1899.

DAVID WILLIAMS COMPANY,	- - - - -	PUBLISHERS.
CHARLES KIRCHHOFF,	- - - - -	EDITOR.
GEO. W. COPE,	- - - - -	ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS,	- - - - -	HARDWARE EDITOR.
JOHN S. KING,	- - - - -	BUSINESS MANAGER.

Andrew Carnegie's Retirement.

The retirement of Andrew Carnegie from active participation in the steel business is an event of the greatest significance. Every one who has fully realized the influence of his dominating personality will appreciate that fact. While he has for many years relied upon a group of able and active partners to bear the burdens of the struggle, his master mind guided the great concern which bears his name in all hours of crisis. His control of the organization was complete and his sway absolute. His brilliant generalship has during the past 20 years carried his concern from relative obscurity to the foremost position in the world in the iron trade.

Mr. Carnegie has carried the American iron trade with him. He has been the unswerving advocate and his plants the most shining examples of the policy of running to full capacity. He has been the man, above all others, who created and fostered the ambition of record breaking. He has more than any other producer spent money lavishly in equipping his plants with the very latest appliances, who has invested earnings most promptly in enlargements. He has set a pace in the iron trade of this country which all have been forced to follow. He has been more than any man the type of the untiring, incalculable exponent of unrestrained competition which the younger generation of business men and manufacturers may admire but do not care to imitate. Mr. Carnegie, although often a party to arrangements or pools, has always been outspoken in his disbelief of them. They may have served a temporary end, but often he has been the first to break away from them.

Other leaders have reached the conclusion that unrestrained competition is hurtful to all interests, and that harmonious relations between the small number of controlling corporations will be more beneficial to stockholders, workmen and to others. The trade generally believes that that is the interpretation to be placed on Mr. Carnegie's withdrawal.

A Timely Caution.

A circular to the members, recently issued by an influential trade organization, gives them some excellent advice which is worthy of wider distribution. The important advances in the prices of all kinds of merchandise have apparently added largely to the profits of all who carry stocks or who make contracts for supplies to be delivered to them in the future. The circular calls attention to this view of the situation—namely, that if stocks were being sold out with the intention of going out of business a very nice profit would be made out of the advances, but it must be borne in mind that every dollar's worth of goods now sold must be replaced, and when replaced the market value must be paid at the time the goods are bought. The point made is emphasized by a leaf taken from the experience of a veteran hardware mer-

chant who says that trade is now going through the very same conditions under almost identically the same circumstances that prevailed in 1879 to 1881. He adds:

"About the middle of 1879 prices commenced to advance very rapidly, and all the jobbers were of the opinion that the year would show to them a very large profit. The result, however, was so very different from their anticipations that, as a matter of fact, by the first of the year 1881 many jobbers were compelled to add additional capital in order to keep their stock up and be able to take care of their trade. The cause of this was the fact that too many jobbers sold their goods calculating a profit upon the basis of their original cost, instead of making present values the basis of their calculations, so that all the profit they made was absorbed in the additional cost on all goods that were bought to replace those that had been sold. The year 1881 marked the beginning of depreciation in all market values, showing a loss to almost every jobber in the middle West at least."

The point thus made is of special value to all who had the foresight to anticipate higher prices and provided themselves with ample stocks. They are strongly tempted, now that they find the market very much higher than their costs, to realize a part of their profit and to sell freely at or below the rates at which they could replace what is thus sold. This is done on the presumption that prices will not be maintained, and that by the time they must replenish their stocks they will be able to buy at much lower rates. They lack faith in the stability of values at their present level, and take chances on a falling market in the near future. Although their experience for a number of years has been precisely of this character, it will not be safe to trust too confidently to a repetition of what has thus happened. The veteran hardware merchant above alluded to may be right in his diagnosis of the situation, and his position is strongly fortified by the continued fine prospects for business in this country and the advancing tendency of prices abroad.

Merchants are not the only class to whom this argument for caution appeals. Manufacturers who enjoy contracts for material placed at low prices are in the same position. Unless they sell their products on the basis of current prices of materials they are also in danger of finding themselves compelled to invest more capital in the future in conducting their business. On the one hand, it is of course possible that prices of their products as well as of their raw materials may recede and that the opportunity may be lost of realizing handsomely on present stocks or contracts; but, on the other hand, if prices should advance still further they are confronted with the danger of being obliged to pay much more for their raw materials and realizing less profit. Prudence should be the watchword in selling as well as in buying under these circumstances.

The railroad companies, more than any other large consuming interest, are manifesting a disposition to circumvent the great consolidations of manufacturers. It is asserted on good authority that a general tendency is shown to increase the equipment of repair shops so that they may be able to build more cars for themselves and thus avoid purchasing from the consolidated car builders. Rumor has it that other fields of activity may be invaded to a greater extent than heretofore on account of the high prices now exacted by manufacturers which are alleged to be exorbitant.

The Missouri Anti-Trust Decision.

Undue importance is attached to the decision recently rendered by the Circuit Court of Appeals at St. Louis against the National Lead Company. This company sued a debtor, who pleaded in defense the Missouri anti-trust law, which provides that a purchaser from any individual, company or corporation transacting business contrary to the provisions of that law shall not be liable for the price of the article purchased, and may plead the act as a defense to any suit for such price. The evidence showed that the National Lead Trust was organized in 1887 to control the lead corroding business of the country. In 1891, after the enactment of legislation adverse to trusts, the National Lead Trust reorganized as a corporation under the name of the National Lead Company and absorbed 30 companies in the United States and Mexico engaged in the manufacture of paints. In prosecuting the suit just decided the attorneys for the National Lead Company contended that the company were a corporation and not a trust. The Court unanimously decided against the company, the decision containing the following statement: "A combination which is illegal under the anti-trust law cannot be operated under the cloak of a corporation by its constituent members or governing bodies." As the case had been carried to the Circuit Court of Appeals by the debtor, against whom the lower Court had found a verdict, it was remanded for retrial, so that the matter has not been absolutely settled.

Nevertheless, this decision is being hailed as a blow on the solar plexus of the great industrial corporations. It is hastily assumed that the views of the Court thus promulgated will have a sweeping effect, particularly in teaching the citizens of other States how to attack these great aggregations of capital. Some of the more conservative organs of public opinion are even alarmed at the possibilities of a general procedure of this character and characterize it as "placing a premium on dishonesty." They do not consider the inculcation of dishonest methods among business men the proper way to handle any question.

Possibly the time may come when some genius of destruction will be able to devise a plan which will compel consolidations to resolve themselves into their original constituent concerns. But it will not be done on the Missouri plan. It happens that in a number of other States similar laws now adorn the statute books. In Illinois, for instance, the anti-trust law contains identically the same provision as that found in the Missouri law, making accounts with "trusts" not collectible. But it does not appear that any Illinois merchant has so far attempted to evade a just debt by pleading that the company from whom he purchased should be classed as a trust and therefore not be paid. It remained for a Missouri merchant to take this stand, but his example, it may safely be assumed, will not be followed to any serious extent by the merchants of his own State who value their business standing. Manufacturers are, of course, always careful about granting credit, and will not knowingly permit men to run up an account with them. Through their sales agents or traveling men they are well informed as to the character for probity of their customers, and we seriously question whether the Missouri decision will make any one of the great industrial consolidations uneasy over the collection of the accounts now due them in even that State. If a few such cases should arise as that in which the National Lead Company figured, the manufacturers would

merely scrutinize their credits closely and cut off all doubtful concerns, which would certainly cause great inconvenience to many merchants while correspondingly increasing the business of others who enjoyed the confidence of the producers.

Laws which promote or wink at dishonesty do not make a whole State dishonest. A few years since the Legislature of a great State enacted a law exempting a "homestead" from seizure for debt without limiting the value of the property. A few dishonest people took advantage of the law by investing in expensive properties for homesteads and then failing in business. After settling with their creditors, they converted the so-called homesteads into cash and re-engaged in business with greater capital than before. This merely made manufacturers, jobbers and banks more careful in granting credit or loaning money, and the State maintained as good a reputation for honesty among its merchants as other commonwealths having a less liberal homestead law. The same principle will undoubtedly hold good in this new development. Business men, as a rule, are honest and value their good names above a little temporary gain. They may dislike consolidations and trusts, but they will find some other way to fight them.

CORRESPONDENCE.

Standardized Drillings and Advancement in Uniformity of Pig Iron Analyses.

To the Editor: What are standardized drillings, and what are they used for? is a question which many foundrymen and others are asking. In brief, they are specially prepared analyzed grades of iron, by which the chemist can trace the accuracy of his work.

Recognizing the necessity of possessing something in the way of standardized drillings has caused many laboratories in the past to make their own. This has generally been done after the following plan: The chemist having decided upon the grade of standard thought best for his work, sought out a piece of clean pig metal of such grade and drilled it until he had obtained from eight to twelve pounds of drillings. These in turn were well mixed and in some cases ground in a mortar to make them sufficiently fine to pass through a 10, 20 or 40 mesh sieve. This done, he packed up a few ounces in different packages and mailed them to his friend chemists with a request that they analyze them for whatever metalloids he had decided to obtain standards for. When the different chemists' results had been reported he accepted the average as his standard for the drillings in his possession. They were generally preserved by being tightly sealed in a glass bottle, labeled with the analysis, placed handy for use at any time.

These standardized drillings being accepted as containing certain percentages of carbon, silicon, sulphur, manganese or phosphorus, could be reanalyzed at any time to check up the chemist's own or others' determinations. An observing person, having the opportunity to visit these laboratories, could often find chemists using their standards to test chemicals or some new short cut methods that he or some other chemist had devised. Then again they might be used to check up his own work or that of others, the correctness of which had been questioned. In reanalyzing a standard, should the same results not be obtained as that accepted for a standard, then the chemist was naturally left to conclude that some of his chemicals, methods or work was at fault.

The process of obtaining their own standards on the part of individual chemists was, as a rule, a long and tedious one. It often took from four to six months before they could get in all results from their friend chemists. Then again, from what the writer has seen of such reports, the chemist could not have absolute confidence in the standards thus obtained, for, as a rule, the different chemists' results varied so much that the average accepted seemed at times more that of guess work than anything coming from accurate methods. The variations of the analyses thus obtained could only cause a great difference in standards being used in different circles, and often be the means of aggravating and perplexing managers of steel works, blast furnaces, foundries and chemists rather than doing them good in trying to remedy evils and losses which the lack of uniformity in analyses could cause to all interested parties.

It was the opportunity to observe the practices of blast furnaces in obtaining their standards which caused the writer to conceive the idea of our country having one central agency from which all could obtain standardized drillings, which had been determined by a few of our most favorably known chemists. The first difficulty confronting such a venture lay in obtaining 300 or more pounds of drillings sure to be uniform throughout their body. This calls for the ability to make a casting weighing 500 pounds or more that would be perfectly clean, sound and homogeneous in its structure to obtain turnings or drillings from. To do this successfully demanded a broad experience in the art of founding. For this reason a well-known writer has recently said that establishing and maintaining a central standardized agency is properly foundrymen's work. Believing this to be true, the writer labored to have the American Foundrymen's Association take up this work at its last convention. Having been honored by the chairmanship of its committee, he has worked with his associates, Dr. R. Moldenke and James Scott, Pittsburgh; P. W. Gates, Chicago, and E. H. Putnam of Detroit, to make this association's Standardizing Bureau a success.

It is but a little more than three months since our committee has had drillings ready for distribution. Since that time 80 laboratories have installed the association's standards in their laboratories. This includes 44 furnace plants and steel and iron companies, 13 colleges, 11 foundries and 12 private laboratories.

THOMAS D. WEST.

SHARPSVILLE, PA.

Asbestos and Graphite.

WASHINGTON, April 25, 1899.—The annual report of the United States Geological Survey concerning the production and consumption of asbestos and graphite, compiled by E. W. Parker, has been completed. The report is of special interest for the reason that during the year 1898 the domestic production of both these articles increased very largely, though in the case of both products the imports continue to lead the domestic production by a wide margin.

Asbestos production in 1898 was limited to two States, California and Georgia, and amounted to 605 short tons, valued at \$10,300, but the quality and price improved to such an extent that while this production amounted to an increase of only 25 tons over that of the previous year, the value showed a rise of \$3850. The domestic production, while insignificant in amount and considered with reference to the magnitude of the manufacturing industry in this country, is still highly important, because of its latent possibilities and because of the wide difference between the domestic and the imported article.

The utilization of imported asbestos in the manufacture of fire proof textiles has been developed in the last decade and a half. Increasing from \$49,940 in 1884 to \$73,643 in 1885, the imports jumped to \$135,125 in 1886, to \$140,845 in 1887, to \$176,710 in 1888, and only in one year (1893, the year of the panic and industrial prostration) has the value of the imports been less than \$200,000, while in 1891 it reached over \$350,000. The total product imported in 1898 was valued at \$299,535, as compared with \$268,264 in 1897.

There have been no new domestic localities reported within the past year, and with the exception of the production at Sall Mountain, Ga., and the trifling output in California work on the known deposits has been limited to the assessment work required by law for preservation of title. The most promising domestic localities, those near Caspar, Wyo. (judgment being based on the samples of the material), cannot compete in the Eastern markets with the extensive and well developed mines of Black Lake and Theadford, in Canada. The richness and proximity of the Canadian chrysolite deposits have been potential factors against the successful operation of our Eastern deposits, while the long distance from the manufacturing centers and the consequent expensive freight costs have militated against the development of the Western localities.

Graphite.

There were five States in which graphite was produced in 1898—Alabama, Michigan, New York, Pennsylvania and Rhode Island. The marketable product consisted of 2,360,000 pounds of crystalline graphite and 890 short tons of amorphous graphite, the aggregate value of which amounted to \$75,200. There were 1300 tons of crude amorphous graphite mined, of which 600 tons were sold as mined and 290 tons were ground and prepared before shipped. The product of crude ore from which the crystalline graphite was obtained amounted to 13,875 short tons, which yielded 2,360,000 pounds of refined material.

The domestic production of crystalline graphite in 1898 was the largest on record, being nearly 1,000,000

pounds in excess of that of 1897 or any previous year. The output from Ticonderoga, N. Y., was the largest ever obtained, to which was added an increased production from Chester County, Pa., and a comparatively small product from Clay County, Ala.

Outside of the increased production in 1898 the most interesting feature was the transfer of the mines in Chester County, Pa., formerly owned by the Penn Plumbago Company, to a new corporation, known as the Standard Graphite Company. This company were engaged in sinking a new shaft and in placing new machinery at the close of 1898, and expected to be shipping early in 1899. The company expect to develop a considerable export trade.

The North Carolina and Texas deposits, mentioned in the report of 1897, have not been developed.

E. G. Acheson, president of the Carborundum Company, has found that when the usual forms of carbon are subjected to as high a temperature as they obtain in their electric furnaces, a temperature higher than necessary for the formation of carborundum, the carbon is principally converted into graphite; the presence of such impurities as silica seems to effect the change. During 1897 this discovery was industrially utilized in the manufacture of a considerable amount of artificial graphite, and more especially subjecting electric light carbons and carbon for other electrodes to graphitization, with the production of graphitized electrodes, such as used in the Castner alkali process, and for the manufacture of self lubricating motor brushes. At the close of 1897 the Acheson Graphite Company were formed, with Mr. Acheson president, for the purpose of entering at once into the production of graphite in bulk from coke or other carbonaceous materials. The crude material will most likely be "breeze" or refuse from the coke ovens, which upon being passed through the high temperature of an electric furnace is largely converted into graphite, the amount of the conversion being governed by the percentage of impurities contained in the carbon. The product will be put upon the market in the manufacture of paint, foundry facings, &c., and for similar purposes.

In 1897 Mr. Acheson graphitized 162,380 pounds of electrodes and motor brushes, and in 1898 145,647 pounds. About 75,000 pounds of graphitized electrodes have been sent to Europe (England and Germany), for use in the Castner process, they having proved many times as efficient as the ungraphitized carbon. They are used also by the Mathieson Alkali Works, at Niagara Falls.

The electrodes and other articles that so far have been graphitized by this process and are now being graphitized by the Acheson Graphite Company have all been made into the regular form out of ordinary carbon, with considerable impurities mixed therewith, by the regular arc light carbon companies, and then delivered to the company at Niagara Falls for graphitization.

It is probable that this new industry will have the effect of extending the use of graphite in many directions.

The imports of graphite in 1898 were valued at \$743,820, as compared with \$270,952 in 1897 and \$437,159 in 1896. The domestic product, while still small compared with the importations, is gradually expanding with the increase in the demand.

W. L. C.

The New England delegation to the meeting of the American Foundrymen's Association at Pittsburgh will leave Boston and other New England points Sunday evening, May 14. The various parties from different New England States will all meet at Jersey City, Monday morning, May 15, and leave there via the Pennsylvania Railroad at 8.13 a.m., reaching Pittsburgh at 7.10 p.m. The Pennsylvania Railroad and their New England connections have made a rate of one fare going and one-third fare returning, on the certificate plan, and the party promises to be a large one. Returning, the New England delegation will probably leave Pittsburgh Friday, May 19, at 10 p.m., reaching New York Saturday, May 20, at 8.15 a.m. Here the party will separate, the Boston contingent leaving on the Fall River Line boat at 5.30 p.m., reaching Boston at 8 a.m. Sunday, and the other members of the party returning from New York on Saturday by rail. B. M. Shaw of the Walker & Pratt Mfg. Company, Boston, is chairman, and this cancels any previous arrangements that may have been announced.

The annual meeting of the shareholders of the General Electric Company, held at Schenectady, N. Y., on May 9, re-elected the old Board of Directors, with one exception. J. P. Ord of Schenectady was chosen in the place of F. S. Hastings of New York.

An election of officers of the Republic Iron & Steel Company will be held at the offices of Simpson, Thatcher & Barnum, 10 Wall street, this afternoon.

Pig Iron Production Increased.

A Further Decline In Stocks.

Although there has been quite an increase in the number of furnaces in blast, their small capacity has not made much impression on the total, which, however, has now surpassed the record.

Stocks show a decline, which proves that consumption is still in excess of the make.

The weekly capacity of the furnaces in blast on May 1 compares as follows with that of preceding periods :

	Furnaces in blast.	Capacity per week. Gross tons.
May 1, 1899.....	217	250,093
April 1.....	205	245,740
March 1.....	192	228,185
February 1.....	195	227,639
January 1.....	200	245,516
December 1, 1898.....	195	235,528
November 1.....	190	228,935
October 1.....	192	215,635
September 1.....	186	213,043
August 1.....	187	206,777
July 1.....	185	216,311
June 1.....	190	225,398
May 1.....	194	234,163
April 1.....	194	233,339
March 1.....	193	234,430
February 1.....	184	228,338
January 1.....	188	226,608
December 1, 1897.....	191	226,024
November 1.....	183	213,159
October 1.....	171	200,128
September 1.....	161	185,506
August 1.....	152	165,378
July 1.....	145	164,064
June 1.....	146	168,380
May 1.....	146	170,528
April 1.....	153	173,279
March 1.....	150	169,086
February 1.....	154	162,959
January 1.....	154	159,720
December 1, 1896.....	147	142,278
November 1.....	153	124,077
October 1.....	130	112,782
September 1.....	145	129,500
August 1.....	173	157,078
July 1.....	191	180,532
June 1.....	194	182,230
May 1.....	196	180,398

The status of the charcoal furnaces was as follows:

Charcoal Furnaces in Blast May 1, 1899.

Location of furnaces.	Total No. of stacks.	No. in blast.	Capacity per week.	No. out of blast.	Capacity per week.
New England.....	11	3	240	8	710
New York.....	13	11	214	0	0
Pennsylvania.....	13	11	550	11	550
Maryland.....	4	0	0	4	569
Virginia.....	4	0	0	4	437
Ohio.....	3	0	140	0	360
Kentucky.....	9	1	0	8	290
Tennessee.....	3	1	275	0	2,240
Georgia.....	12	0	691	10	670
Alabama.....	18	7	3,023	11	4,100
Michigan, Missouri and Wisconsin.....	4	1	163	3	710
Texas.....	1	0	0	1	175
Utah.....	1	0	0	1	275
Oregon.....	1	0	0	1	275
Totals.....	92	20	4,846	72	12,976

As compared with previous months the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
May 1, 1899.....	20	4,846
April 1.....	17	4,777
March 1.....	16	4,330
February 1.....	17	4,967
January 1.....	20	6,026
December 1, 1898.....	18	6,018
November 1.....	20	5,947
October 1.....	21	5,732
September 1.....	21	6,293
August 1.....	22	6,459
July 1.....	19	5,647
June 1.....	20	6,762
May 1.....	18	6,571
April 1.....	16	5,716
March 1.....	16	5,470
February 1.....	14	4,734
January 1, 1898.....	16	5,442
December 1, 1897.....	19	5,061
November 1.....	19	4,656
October 1.....	20	4,636
September 1.....	21	4,556
August 1.....	20	4,606
July 1.....	14	2,594
June 1.....	15	3,321
May 1.....	15	3,729
April 1.....	16	5,395
March 1.....	18	5,425

During the month Old Alcalde in Texas, Richmond in Massachusetts and Greenwood in Pennsylvania were started.

The status of the coke and anthracite furnaces was as follows:

Coke and Anthracite Furnaces in Blast May 1.

Location of furnaces.	Total No. of stacks.	No. in blast.	Capacity per week.	No. out of blast.	Capacity per week.
New York.....	11	3	4,205	8	6,164
New Jersey.....	12	2	1,764	0	0
Spiegel.....	3	3	502	0	0
Pennsylvania:					
Lehigh Valley.....	20	16	8,095	10	4,275
Spiegel.....	1	0	0	1	90
Schuylkill Valley.....	12	7	5,468	5	3,093
Upper Susquehanna Valley.....	4	3	3,061	1	600
Lower Susquehanna Valley.....	10	5	8,162	5	1,820
Lebanon Valley.....	12	11	8,075	1	534
Pittsburgh District.....	28	27	60,736	1	2,045
Spiegel.....	12	2	1,890	0	0
Shenango Valley.....	15	11	17,063	4	4,429
Western Pennsylvania.....	20	8	10,115	12	6,840
Spiegel.....	1	0	0	1	850
Maryland.....	5	3	5,314	12	1,950
Wheeling District.....	9	3	11,369	1	1,080
Ohio:					
Mahoning Valley.....	13	10	17,174	3	3,255
Central and Northern.....	9	9	13,045	0	0
Hocking Valley.....	2	1	292	1	550
Hanging Rock.....	12	7	3,041	5	1,147
Illinois.....	16	14	26,178	2	1,750
Spiegel.....	1	1	934	0	0
Minnesota.....	1	0	0	1	629
Wisconsin.....	4	3	3,081	1	700
Missouri.....	12	1	960	1	600
Colorado.....	3	2	2,286	1	700
The South:					
Virginia.....	22	9	6,305	13	7,720
Kentucky.....	5	5	3,270	0	0
Alabama.....	30	19	19,550	11	8,750
Tennessee.....	13	6	4,471	7	3,890
Georgia.....	2	0	0	2	960
North Carolina.....	2	1	650	1	400
Totals.....	298	197	245,249	101	64,800

In comparison with previous months the record of the coke and anthracite furnaces stands as follows in gross tons:

	Number in blast.	Capacity per week.
May 1, 1899.....	197	245,249
April 1.....	189	240,969
March 1.....	175	223,865
February 1.....	178	232,672
January 1, 1899.....	180	237,490
December 1, 1898.....	177	229,510
November 1.....	176	222,988
October 1.....	172	209,903
September 1.....	165	206,750
August 1.....	165	200,318
July 1.....	166	210,664
June 1.....	170	218,636
May 1.....	176	227,592
April 1.....	178	227,623
March 1.....	177	228,960
February 1.....	170	223,604
January 1, 1898.....	172	221,166
December 1, 1897.....	172	220,962
November 1.....	164	206,566
October 1.....	151	195,492
September 1.....	140	180,951
August 1.....	132	161,375
July 1.....	131	161,170
June 1.....	131	165,069
May 1.....	133	163,790
April 1.....	137	167,911
March 1.....	138	164,561

During April quite a number of furnaces blew in, among them being the new stack of the Reading Iron Company, No. 5 of the Allentown Iron Works, one of the Allentown Rolling Mill, Cruenwold, and one Keystone of the Thomas Iron Company in the Lehigh Valley, one Paxton on the Lower Susquehanna, Ivanhoe in Virginia, Ashland No. 3 in Kentucky, River in the Cleveland district, Lawrence in the Hanging Rock region, one De Bardeleben in Alabama, and Greensboro in North Carolina. During the month two Cambria furnaces went out, and one Maryland was banked.

Furnace Stocks.

The position of furnace stocks, sold and unsold, as reported to us, was as follows on May 1, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

	Dec. 1.	Jan. 1.	Feb. 1.	Mar. 1.	April 1.	May 1.
Stocks.						
Anthracite and coke.....	441,971	402,260	365,311	328,987	239,907	205,125
Charcoal.....	107,353	104,315	97,599	98,094	82,056	75,583
Totals.....	544,024	506,575	462,904	427,081	311,963	280,708

Warrant Stocks.

We are indebted to the American Pig Iron Storage Warrant Company for the following statement of stocks of warrant iron:

	Dec. 1.	Jan. 1.	Feb. 1.	Mar. 1.	Apr. 1.	May 1.
Stocks.						
Coke and Anthracite.....	122,000	113,100	100,700	95,000	82,700	60,700
Charcoal.....	38,900	37,700	34,500	31,300	27,000	25,800
Totals.....	160,900	150,800	135,200	126,300	109,700	86,500

The Mechanical Engineers.

(By Telegraph.)

WASHINGTON, D. C., May 10, 1899.—The formal opening of the thirty-ninth meeting of the American Society of Mechanical Engineers took place Tuesday evening in the beautiful Corcoran Art Gallery Building, Washington. The guests were received by Mrs. Geo. Westinghouse and Rear-Admiral Geo. W. Melville, president of the society, together with the Reception Committee, consisting of 21 resident members. Among those in attendance were Rear-Admiral Geo. W. Melville, president; Wm. H. Wiley, New York, treasurer; F. R. Hutton, New York, secretary; Frank B. King, chairman Executive Committee, Washington; Chas. E. Foster, Washington; Wm. Harkness, Washington; Herman Hollerith, Washington; Arthur E. Johnson, Washington; Hervey S. Knight, Washington; Walter A. McFarland, Washington; Geo. L. Morton, Washington; Harold P. Norton, Washington; Alfred H. Raynal, Washington; Chas. E. Rommel, Washington; W. E. Schoenborn, Washington; Geo. R. Simpson, Washington; Wm. B. Upton, Washington; Anthony Victorin, Washington; William Wallace, Washington; Winthrop Cole, Washington; F. H. Stillman, New York; Gus C. Henning, New York; N. C. Stiles, Watertown, N. Y.; George I. Rockwood, Worcester, Mass.; Wm. L. Ames, Worcester, Mass.; Francis H. Richards, Hartford, Conn.; Chas. H. Nicoll, Newark, N. J.; Frank Mossberg, Attleboro, Mass.; W. D. Hoxie, New York; E. C. Bullard, Bridgeport, Conn.; Chas. W. Hunt, New York; E. H. Parks, Providence, R. I.; Geo. M. Bond, Hartford, Conn.; Ambrose Swasey, Cleveland, Ohio; James Hartness, Springfield, Vt.; Daniel Ashworth, Pittsburgh; Paul H. Grimm, Glen Cove, N. Y.; Thomas R. Almond, Brooklyn; Frank Kempsmith, Milwaukee, Wis.; Charles H. Morgan, Worcester; Geo. Richmond, New York; J. B. Stanwood, Cincinnati; George H. Smith, Providence, R. I.; W. F. Barnes, Rockford, Ill.; Peter Kirkeraag, Youngstown; Geo. R. Stetson, New Bedford; E. R. Fellows, Springfield, Vt.; Franklin Philips, Newark.

The members were welcomed by Col. T. A. Bingham United States engineer in charge of public buildings and grounds. He said that the capital of our nation is essentially a sentimental capital, as Italian Rome is also called, and in its more prominent features will even to-day bear comparison with any of the capitals of the world, while we have every reason to trust that its future development, will result in the most beautiful capital of the civilized world. The city will probably never become an important commercial or manufacturing center. Perhaps it is better so. On the other hand you will see here a residence city of uniquely beautiful design, with broad clean streets and plenty of "breathing spaces," which by the way are at present in some danger of being treated as building spaces. After referring to the city as being one of the best governed in the country and to the diversified character of its inhabitants, he expressed regret that the visitors would not have the pleasure of meeting President McKinley, who is away from the Capital. He said that Washington is already worthy of being called the monumental city, for not only is there a rapidly increasing number of statues of our great men, but the buildings rising from year to year are monuments to the men who build them. The greatest monument of the civilized world is perhaps that noble shaft to the memory of Washington. The speaker then described some of the main features of the monument and promised to point out many interesting points about the shaft when the engineers visit it next Friday evening. The structure was originally founded upon sand and gravel, which proving inadequate was removed and a concrete base substituted. The pyramid, too, was not secured with cement, but was keyed to the structure, and the interior double iron frame and elevator are the same used in the construction of the shaft. No attempt has as yet been made to keep a record of the movements of the monument due to changes of temperature, although it is the intention to shortly

establish a plumb line from the 500-foot level for this purpose.

Rear-Admiral Melville, speaking as president of the society, said that it was unnecessary to add anything to the welcome already extended. It was the earnest desire of the local members that those from abroad should thoroughly enjoy their visit.

The first business session was held Wednesday morning. The report of the Finance Committee for the first half of the current year showed that the receipts exceeded the regular expenses by \$3414. An interesting report covered the meetings of the junior members of the society. During the meetings already held by the juniors many valuable and timely papers have been presented. During the coming winter monthly meetings will be held at the society house. The programme for these meetings has already been determined upon.

Steam Boiler Trials.

The committee appointed to consider the question of a standard method of conducting steam boiler trials presented a very complete report. The introduction outlines the work done:

The committee of 1895 presented a full statement of the principles which governed it in the preparation of the Code of Rules at that time recommended. These principles covered the ground in an admirable manner, so far as the practice of boiler testing had been perfected, and we are in unanimous accord with the sentiments which the report of that committee expressed. During the interval of 13 years which has passed, methods and instruments have in some measure changed. Improvements have been made in the instruments for determining the moisture in steam. The throttling and separating form of calorimeters have displaced the barrel and other types of steam calorimeters referred to in the previous report. Attention has been devoted to the determination of the calorific value of coal, and a number of coal calorimeters have been brought out and successfully used for this purpose. It has come to be a practice with many experts to include in the table of results of boiler tests the percentage of efficiency, or proportion of the calorific value of the coal which is utilized by the boiler. Specifications and contracts are in some cases drawn up providing for certain percentages of efficiency instead of a specified evaporation. The analysis of flue gases is receiving more attention than formerly, not only in our educational institutions but also in the regular practice of engineers who make a specialty of boiler testing.

Your committee submits a revised code, termed the Code of 1899. The changes are mainly in the line of amendments such as the experience of the last 13 years has shown to be desirable. The amendments relate to the use of improved steam calorimeters, to sampling coal and determining its moisture, to calorific tests and analysis of coal, to analysis of flue gases, to smoke observations, to determinations of efficiency, and to methods of working out the heat balance.

The tabular form of presenting the results of the test is somewhat changed and enlarged, and alterations in the text of the code are made wherever needed. At the same time a second or short form of report is added, for use in commercial tests or in cases where it is necessary to give only the principal data and results.

It is beyond the province of the committee to recommend instruments of particular makers for obtaining the quality of the steam, the calorific value of the fuel, or any other data relating to the trial; but following the practice of the former committee, individual members have submitted their views (with the approval of the full membership) in an Appendix to the 1899 Code, signed by their initials. In this appendix are included some of the articles from the appendix to the former code, which are thought to be of especial value.

In the matter of instruments for determining the calorific value of fuel, it seems desirable that the committee should make a recommendation which is as specific as present knowledge and circumstances will warrant. It is agreed that some form of calorimeter in which the coal is burned in an atmosphere of oxygen gas is to be preferred, and it is generally held that the most perfect apparatus thus far brought out is the Bomb Calorimeter, originally designed by Berthelot and modified by Mahler and Hempel. Several of these instruments are in use in this country, principally in the laboratories of engineering schools; but the apparatus is complicated and expensive, and it is not probable that many engineers will have the instrument as a part of their equipment for testing boilers. It is recommended, therefore, that samples of the coal used in testing boilers be sent for determinations of their heating value to a testing laboratory provided with one of these instruments, or with

some instrument which shall be proven to be equally good.

The committee approves the conclusions of the 1885 code to the effect that the standard unit of evaporation should be 1 pound of water at 212 degrees F. evaporated into dry steam of the same temperature. This unit is equivalent to 965.7 British thermal units.

The committee recommends that, as far as possible, the capacity of a boiler be expressed in terms of the "number of pounds of water evaporated per hour from and at 212 degrees." It does not seem expedient, however, to abandon the widely recognized measure of capacity of stationary or land boilers expressed in terms of boiler horse-power.

The unit of commercial boiler horse-power adopted by the committee of 1885 was the same as that used in the reports of the boiler tests made at the Centennial Exhibition in 1876. The committee of 1885 reported in favor of this standard in language of which the following is an extract:

"Your committee, after due consideration, has determined to accept the Centennial standard, and to recommend that in all standard trials the commercial horse-power be taken as an evaporation of 30 pounds of water per hour from a feed water temperature of 100 degrees F. into steam at 70 pounds gauge pressure, which shall be considered to be equal to $34\frac{1}{2}$ units of evaporation; that is, to $34\frac{1}{2}$ pounds of water evaporated from a feed water temperature of 212 degrees F. into steam at the same temperature. This standard is equal to 33,305 thermal units per hour."

The present committee accepts the same standard, but reverses the order of two clauses in the statement, and slightly modifies them to read as follows:

"The unit of commercial horse-power developed by a boiler shall be taken as $34\frac{1}{2}$ units of evaporation per hour; that is, $34\frac{1}{2}$ pounds of water evaporated per hour from a feed water temperature of 212 degrees F. into dry steam of the same temperature. This standard is equivalent to 33,317 British thermal units per hour. It is also practically equivalent to an evaporation of 30 pounds of water from a feed water temperature of 100 degrees F. into steam at 70 pounds gauge pressure."

The committee also indorses the statement of the committee of 1885 concerning the commercial rating of boilers, changing somewhat its wording, so as to read as follows:

"A boiler rated at any stated capacity should develop that capacity when using the best coal ordinarily sold in the market where the boiler is located, when fired by an ordinary fireman, without forcing the fires, while exhibiting good economy; and, further, the boiler should develop at least one-third more than the stated capacity when using the same fuel and operated by the same fireman, the full draft being employed and the fires being crowded; the available draft at the damper, unless otherwise understood, being not less than $\frac{1}{2}$ inch water column."

The report then follows with complete directions for making boiler tests, and presents typical sheets for placing the results. The definitions and directions presented are of the most explicit character, and cannot fail to carry the full meaning of the several steps necessary in a boiler trial.

The committee appointed to formulate a standard method of reporting steam engine trials stated that the work has taken an international form. Voluminous correspondence has been received from American and foreign experts and manufacturers, and the amount of work required of the committee compelled them to defer the complete reports.

The first paper on the list was by J. B. Stanwood of Cincinnati on

Standards for Direct Connected Generating Sets, of which the following is an abstract:

An important factor in America's industrial progress has been the extended application of standards. There are standard dimensions for materials; standard sizes, parts and capacities of machines; standard gauges for close measurements; standard systems of inspection and testing, &c.

These different forms or methods of standardization have usually originated or developed in commercial and manufacturing activities, independent of any governmental instigation or control. They are universally recognized and employed wherever industry and commerce exist throughout our land.

This principle, as carried out in our individual shops and factories, has developed the well-known interchangeable system of construction, which, by forcing attention and care upon little things, has further specialized operations, and has stimulated the development of special machines to perform these operations, to the end that the cost of production has been greatly reduced.

Such standardization inside and outside of the shops also aids rapidity of production, inasmuch as standard material can be kept in stock to form standard parts or to complete standard machines, apparatus or goods, all before these are even ordered.

These results—cheap production and prompt delivery—in connection with a high grade of product (to which these methods contribute) are most powerful factors for securing and maintaining foreign trade. Such influences are particularly active in America to-day.

In the steam engine industry these methods have been largely in use; but within the past few years they have been rendered partially inapplicable by a radical change in the environment, due to the introduction of electricity and the employment of high steam pressure.

By the introduction of an electrical generator attached to and directly driven by the main shaft of a steam engine a new machine has been evolved. But the introduction of this system has brought a world of complication and expense to both the engine and generator manufacturers, while, to some, serious financial loss has been the result.

The principal cause of these difficulties has been the lack of standard sizes, speeds and important dimensions of electrical generators, so that the adaptation of the steam engine in each case has been made a special problem, frequently requiring special design and construction.

To complicate the matter, the determination of the sizes and speeds of such generators is usually in the hands of a third party who is not in touch with either the engine or generator builder. He may be a consulting electrical or mechanical engineer, an architect, a salesman, an agent or some person presumably skilled in deciding upon the necessary machinery to satisfy certain conditions.

If fortunately there had existed a list of capacities and speeds for electrical generators that was recommended by proper authorities, this list would gradually be used by such persons in securing and specifying the machine to be employed. As it now is, any odd size and speed may be selected by them; as, for instance, to my knowledge, a 45-kilowatt generator to be operated at 210 revolutions was once specified, almost at random.

STANDARDIZATION.

What are the features that need standardization? First, for the use of the outside engineer there is a need for a standard series of capacities and speeds, and, second, those parts of the engine and generator which have to be connected or fastened together should be standardized for each different size to facilitate the assembling of the combined machine or "set."

1. *a*, Relative to a standard series of capacities and speeds, the different capacities or sizes should be selected to satisfy the usual demands of the market. The number of different sizes should not be too large, in order that the cost of production may not be enhanced by too great a variety of both generators and engines.

In this connection there might be a standard method of determining the capacity of a generator, which would designate, with a given load or percentage of overload, a given time limit within which a permissible increase of temperature of the field coils, armature and commutator can occur.

2. *b*, Relative to speeds, there should be at least three classes of speeds for each size or capacity of generator, corresponding, in the main, to the three classes of engines now on the market. These are known respectively as slow, medium and high speed engines. By arranging the generator speed in this manner most of the conditions arising in practice could be met. There would be slow speed for factory, manufacturing or street railway service, which would be expensive, but durable and easily tended. A medium speed could be used for lighting plants or conditions where lower first cost and a more limited space exist, but which will require closer attention and will probably be less durable. Lastly, the high speed "set" would be required for limited space, low first cost, but it will require close attention and will probably be subject to heavier repairs.

Perhaps a series of generators could be arranged so that, by a modification in windings only, a given size for a standard slow speed could be used for larger standard sizes, at standard medium and high speeds.

3. As to the standardization of the dimensions of those parts of the engine and dynamo which are connected together there are: *a*, The shaft diameter and armature bore, which should both be expressed in thousandths of an inch; *b*, the length of shaft outside of the engine, and the location thereon of the outboard bearing, should be given in inches and feet; *c*, the distance from center of armature to sub-base, in inches, and, *d*, the length and width of generator base, and the size and location thereon of the bolts which attach it to the sub-base, are probably all that are required.

Such a system would materially reduce the complication of construction and erection. A fewer number of engines with their sub-bases and generators would be required. These, in the marketable sizes, could be carried in stock ready for any combination, thereby permitting manufacturers to avail themselves of multiple production, so great a factor in reducing costs, improving quality and facilitating delivery.

An American system of standards well introduced abroad and at home might give to us a large share of the electrical and engine business of the world.

In this connection it seems to me that our society and the American Institute of Electrical Engineers are the proper authorities to undertake such an investigation as will, by their recommendation, bring about such a result.

To initiate a movement for this purpose I do move that the Council be requested to communicate with the American Institute of Electrical Engineers to ascertain if that institute will agree to appoint a committee to co-operate with a similar committee to be appointed by the American Society of Mechanical Engineers, to determine upon and recommend a standard series of capacities, speeds and necessary dimensions for electrical generators for direct connection to steam engines.

And, furthermore, if a favorable response be received, then the president be requested, with the concurrence of the Council, to appoint a committee of the proper size to co-operate with the committee to be appointed by the American Institute of Electrical Engineers for the purpose herewith set forth.

Discussion.

This paper caused considerable discussion. A complete system of standardization is of more moment to the engineer than to the dynamo builder. The engine designer must fit his machine to each particular generator and make expensive changes in his bed plates in all direct connected sets. It was pointed out that in particular there should be some degree of uniformity in engine and armature shafts which are to be coupled and run together. Present practice makes the former much the larger. In this connection the fact must not be lost sight of that the engine is a reciprocating machine, while the generator is a rotary. Professor Aldrich said that while it was difficult to standardize each unit separately, it was more difficulty to standardize the dual unit. The trouble has been laid at the door of the electrician because of his seeming indifference to the wants of the steam man. He came into the field long after the steam engine had occupied it, and some think he should sacrifice his own requirements for that reason. It should be remembered that the electrician in designing a generator is governed by capacities—that is, the number of lights, &c.—and the engine must handle the results but cannot alter the pattern. That is, the engine man must follow the other and give him what he wants.

Mr. Forbes stated that if anything is done toward adopting standard sizes, patterns, speeds and capacities it should be done quickly, for he knew that in two foreign countries they were considering these questions mainly with the view of retaining trade. They appreciated the evil effects of the present haphazard way of manufacturing two machines intended to run together, and proposed to remedy the trouble if possible. The meeting voted to appoint a committee to confer with the American Institute of Electrical Engineers and formulate standards covering the steam engine and dynamo.

OBITUARY.

S. L. BIGGERS.

Samuel Lowry Biggers was born in St. Louis, Mo., August 14, 1861. He was educated in the public schools, graduating from the high school in June, 1878. In August of the same year he began his work with the Simmons Hardware Company and continued his connection with the firm until his death on April 19, 1899. By his faithfulness in his work he soon became a buyer for the company. No one could have been more loyal to his employers or have the interest of the company more at heart than he always had. His earnestness and devotion to all that concerned their welfare were too much for his physical strength. Hoping to make it useful in his business life he studied Spanish and became an active member of the Spanish Club, now the Latin-American Club. He made several long trips to Mexico and Central America on

business for his company. From his ready use of the Spanish language he was appointed consul of the Argentine Republic in St. Louis. In August, 1898, he went to Asheville, N. C., where he spent two months, returning home slightly improved in health. On November 30 accompanied by his wife he went to Phoenix, Ariz., where he hoped to fully recover his health, but was disappointed, and in February last they went to Pasadena, Cal. On April 16 he started home, but as the change of trains at Kansas City was too much for his strength he passed peacefully away just 20 minutes after his brother, William D. Biggers, and his physician met him at Kansas City.

GEORGE STERICK.

George Sterick, superintendent of the beam mill at the Carnegie Steel Company's Homestead works, died at Homestead, Pa., on May 1, aged 48 years.

DANIEL T. KELLEY.

Daniel T. Kelley, head of the firm of Daniel T. Kelley & Sons, foundrymen of Portland, Maine, died in that city on May 5, aged 54 years. He was born in Ireland and came to the United States when a child. He learned the trade of machinist and started several years ago a foundry in a small way, which he built up to a large business, extending throughout New England. He was also engaged in the manufacture of agricultural implements.

HUGH F. DAVITT.

Hugh F. Davitt, manager of the Trask Iron Foundry, Springfield, Mass., died suddenly of heart failure on May 1.

E. H. KNIGHT.

E. H. Knight of the old and well-known iron firm of C. C. Knight & Brother of Philadelphia died somewhat suddenly on May 5. The deceased was about 58 years of age and was much respected, having spent his entire business life in the iron trade in the same location in which his grandfather commenced business more than 80 years ago.

PERSONAL.

C. L. Miller, formerly general superintendent of Joliet works of the Illinois Steel Company, has been appointed general superintendent of mills in the Pittsburgh district of the American Steel & Wire Company.

P. F. Sullivan, for some time connected with the sales department of the Union Mining Company of Pittsburgh, has accepted a position with G. W. McClure, Son & Co., engineers and contractors, Smith Building, Pittsburgh, Pa.

Wm. E. Taylor, formerly treasurer of the Union Iron & Steel Company at Youngstown, Ohio, has been elected general manager of the mills of the American Steel Hoop Company in the Mahoning and Shenango Valleys, with headquarters in Pittsburgh.

J. C. Searight of New Castle, Pa., has been appointed local superintendent of Thomas Furnace of the National Steel Company at Niles, Ohio.

George Westinghouse of Pittsburgh, Pa., sailed for Europe last week on the "St. Louis." He will join H. H. Westinghouse, who is now abroad.

Dr. Edward Hopkinson, C.E., vice-president of the firm of Mather & Platt, Limited, of the Salford Iron Works, Manchester, England, has arrived East after a business tour in the Western and Central States. He sails for home on May 13. Dr. Hopkinson has placed orders in this country for a number of large machine tools for the equipment of extensive new electrical shops which his firm are about to erect.

George B. Zug of the iron manufacturing firm of Zug & Co., Limited, Pittsburgh, Pa., sailed for Europe last week on the "St. Louis," to be absent until the early fall.

Walter Kennedy, consulting engineer, has opened offices at 631 Penn avenue, Pittsburgh. Mr. Kennedy will give particular attention to blast furnace, Bessemer and open hearth steel works construction. He is the inventor of a new design of blast furnace charging apparatus, which is in use at several furnaces, giving very satisfactory results. Mr. Kennedy also is vice president of the Empire Iron & Steel Company, recently organized.

R. Midzutani and Hyo Hamada, part owners of the Mitsui-Bishi Dockyards and Engine Works, Nagasaki, Japan, the largest plant of the kind in that country, were in Pittsburgh this week inspecting the Carnegie Steel Company's works, with the view, it is understood, to the purchase of shipbuilding material.

H. B. C. Nitze, mining engineer, of Baltimore, Md., has gone to Porto Rico to examine into some deposits of magnetic iron ore said to exist in the southern part of that island.

The Iron and Metal Trades.

The fusion of all the Carnegie interests into one large company and the withdrawal of Andrew Carnegie from active management is the one leading topic. How extensive and varied the interests involved are is shown by the review of them which we print elsewhere. The significance of this event cannot be gauged for some time to come, since the personal element enters into the matter so largely, but the trade generally regard it as tending toward harmonious co-operation of the large interests. Whether ultimately this will lead to fusion will probably depend upon later developments.

The details of the new organization are not yet in shape for publication.

There are many indications that the Iron markets are again reaching a critical period, and it will take tact and forbearance on the part of producers and consumers alike to prevent another sharp advance. The scarcity of Pig Iron and of Steel is getting more pronounced. Our monthly Pig Iron statistics show that the production of Coke and Anthracite Iron during April increased only 4300 tons per week, while the furnace and warrant stocks declined 46,700 tons. In other words, consumption is still in excess of current requirements. It is true that we are entitled to look forward to a steady increase in the output, East and South, but experience thus far has taught how slow that is. The leading producers are now sold up for the third quarter and many beyond that period.

During the week the associated Bessemer furnaces have again advanced prices and have sold what prompt Iron they had. In the Foundry Iron trade the market has stiffened in Philadelphia, Chicago and other distributing points and warrants are now pretty well cleaned up. Even furnaces now preparing to go into blast have much of their tonnage engaged.

An indication of the situation abroad is furnished by a serious inquiry for 60,000 tons for steel purposes, for German account. Of course nothing can be done with it.

In Steel the scarcity is growing acute. One large consuming interest is known to have purchased in the Central West a large part of what Steel was available, the quantity involved being variously estimated at 100,000 to 200,000 tons. The price is reported to have been \$25 at mill.

The consolidation of the Tube mills is nearly completed and may be announced in a few days. The tonnage involved is about 1,000,000 tons of Finished Tubular products. A further advance in Merchant Pipe has been established. An interesting inquiry now in the market is for 200 miles of 10-inch Pipe.

The fact that some of the consolidations are still in process of formation has hampered business, while the advance in prices demanded in other directions has led buyers to hold off.

The activity of promoters has now turned to the Eastern mills, many of which are now under option to parties endeavoring to consolidate Bar and Bolt and Nut concerns.

In the Metal markets Tin has eased off, while Lead is strengthened. The Copper market is now represented by 18½ cents for Lake, against 19 cents recently asked.

A Comparison of Prices

At date, one week, one month and one year previous.

Advances Over the Previous Month in Heavy Type Declines in Italics.

	May 10, 1899.	May 3, 1899.	Apr. 12, 1899.	May 11, 1898.
PIG IRON:				
Foundry Pig, No. 2, Standard, Philadelphia.....	\$15.75	\$15.75	\$15.75	\$10.00
Foundry Pig, No. 2, Southern, Cincinnati.....	14.50	14.50	14.50	9.00
Foundry Pig, No. 2, Local, Chicago.....	15.50	15.00	15.00	11.00
Bessemer Pig, Pittsburgh.....	15.65	15.00	15.00	10.30
Gray Forge, Pittsburgh.....	14.75	14.50	14.50	9.15
Lake Superior Charcoal, Chicago.....	.....	17.00	17.00	11.50
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh.....	26 00	26.00	25.50	15.00
Steel Billets, Philadelphia.....	28.50	27.50	27.50	17.00
Steel Billets, Chicago.....	27.00	25.50	25.50	17.00
Wire Rods, Pittsburgh.....	32.00	32.00	.....	20.50
Steel Rails, Heavy, Eastern Mill.....	25.00	25.00	25.00	18.00
Spikes, Tidewater.....	1.70	1.70	1.70	1.40
Splice Bars, Tidewater.....	1.40	1.40	1.35	1.05
OLD MATERIAL:				
O. Steel Rails, Chicago.....	11.50	11.50	11.75	8.00
O. Steel Rails, Philadelphia.....	14.00	14.00	13.00	10.25
O. Iron Rails, Chicago.....	18.00	18.00	18.00	12.25
O. Iron Rails, Philadelphia.....	18.00	18.00	18.00	12.00
O. Car Wheels, Chicago.....	14.75	15.50	15.00	11.50
O. Car Wheels, Philadelphia.....	15.00	15.00	15.00	10.25
Heavy Steel Scrap, Chicago.....	10.00	10.00	12.00	8.00
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia.....	1.55	1.55	1.50	1.05
Common Iron Bars, Youngstown.....	1.55	1.55	1.50	0.95
Steel Bars, Tidewater.....	1.75	1.75	1.50	1.10
Steel Bars, Pittsburgh.....	1.65	1.65	1.50	0.95
Tank Plates, Tidewater.....	2.20	2.20	2.15	1.20
Tank Plates, Pittsburgh.....	2.10	2.10	2.00	1.10
Beams, Tidewater.....	1.63	1.63	1.63	.....
Beams, Pittsburgh.....	1.50	1.50	1.50	.....
Angles, Tidewater.....	1.65	1.65	1.60	1.15
Angles, Pittsburgh.....	1.50	1.50	1.50	1.05
Skelp, Grooved Iron, Pittsburgh.....	1.70	1.75	1.60	1.05
Skelp, Sheared Iron, Pittsburgh.....	1.90	1.90	1.90	1.12½
Sheets, No. 27, Chicago.....	2.90	2.70	2.70	2.10
Sheets, No. 27, Pittsburgh.....	2.70	2.75	2.50	1.90
Barb Wire, Galv., f.o.b. Pittsburgh.....	2.70	2.70	2.50	1.65
Wire Nails, f.o.b. Pittsburgh.....	2.10	2.10	2.00	1.30
Cut Nails, Mill.....	1.65	1.65	1.65	1.17½
METALS:				
Copper, New York.....	18.50	19.25	18.50	12.00
Spelter, St. Louis.....	6.75	6.70	6.50	3.95
Lead, New York.....	4.45	4.37½	4.27½	3.65
Lead, St. Louis.....	4.35	4.30	4.12½	3.60
Tin, New York.....	25.30	25.85	24.50	14.50
Antimony, Hallett, New York.....	10.00	10.00	10.00	3.75
Nickel, New York.....	38.00	38.00	38.00	34.00
Tin Plate, Domestic, Bessemer, 160 lbs., New York.....	4.05	4.05	4.05	2.90

Chicago (By Telegraph.)

Office of The Iron Age, 805 Fisher Building, {
CHICAGO, May 10, 1899. }

A difference of opinion prevails among buyers regarding the proper policy to be pursued concerning the future. Some are disposed to be very cautious, fearing that present prices will not be maintained, and express themselves as intending to purchase strictly from hand to mouth. Others, who are probably influenced by a good demand for their own products, are inclined to make contracts for future delivery if they can get producers willing to make prices on the basis of present quotations or lower. The scarcity of Steel and the strong probability of a shortage of Pig Iron are, however, having their influence in deterring producers from making engagements for any considerable period at present prices. The chances seem to be in favor of those who are able to make contracts for their supplies at present rates. All the influences now prevailing seem to be in the direction of increased strength rather than of weakness. A very encouraging local condition is the report just issued by the Chicago city authorities relative to building permits issued during April. These permits involve an expenditure of practically \$3,000,000, or more than double the corresponding month of last year, and only exceeded about three times in the decade, and if other localities show the same activity in building, and it is presumed that Chicago is not an exception, it bespeaks an exceedingly prosperous condition for the general trade. The leading Plow manufacturers of the country met in this city on Monday and arranged to form a consolidation, which is expected to have a capital of \$65,000,000.

Pig Iron.—The current is strong, although business is not called active. Considerable buying is being done quietly. Several 1000-ton lots have been placed, some for Northern and others for Southern brands. The local companies marked up quotations 50c. to check buying, but found the higher rate accepted by some buyers. A Southern furnace not yet blown in has half its product sold for a year at full market rates. Much more Charcoal Iron could be sold if it was available. Present prices may seem high as compared with last year's rates, but sales agents are confident that they will go higher when consumers begin in earnest to place contracts for

delivery over the last half of year. Inquiries are now being received not only for such deliveries, but extending into next year. We quote for cash as follows:

Lake Superior Charcoal.....	\$17.00 to \$18.00
Local Coke Foundry, No. 1.....	16.00 to 16.50
Local Coke Foundry, No. 2.....	15.50 to 16.00
Local Coke Foundry, No. 3.....	15.00 to 15.50
Local Scotch, No. 1.....	16.50 to 17.00
Ohio Strong Softeners, No. 1.....	17.00 to 18.00
Southern Silvery.....	16.00 to 16.25
Southern Coke, No. 1.....	16.00 to 16.25
Southern Coke, No. 2.....	15.50 to 15.75
Southern Coke, No. 3.....	15.00 to 15.25
Southern Coke, No. 1 Soft.....	15.75 to 16.00
Southern Coke, No. 2 Soft.....	15.50 to 15.75
Poundry Forge.....	14.25 to 14.50
Gray Forge and Mottled.....	14.50 to 14.75
Southern Charcoal Softeners.....	16.00 to 16.50
Alabama and Georgia Car Wheel.....	18.00 to 19.00
Malleable Bessemer.....	to 16.00
Standard Bessemer.....	to 16.00
Spiegel, 20 per cent.....	to 30.00
Jackson County Silvery, according to Silicon.....	18.00 to 19.00

Cast Iron Pipe.—Contracts were lighter the past week than previously, but the volume of business is still quite large. Bids are being held under consideration by a number of municipalities on account of the high prices now asked, but it is believed that a better knowledge of market conditions will cause the business thus pending to be placed to a considerable extent.

Bars.—The Bar Iron trade is waiting for the completion of the arrangements for the organization of the Republic Iron & Steel Company. Some mills in this vicinity have already been taken over by the new company and are beginning to make quotations, but others are shut down, taking inventory. The closing of a number of mills for this purpose has cut down the production of Bar Iron very considerably, the result being felt by jobbers, whose stocks are getting seriously broken. The business now doing is on a basis of 1.60c. to 1.65c., Chicago, for mill shipments, Common Iron. Considerable inquiry is being received, but large buyers are deferring purchasing until the great consolidation is ready to arrange for deliveries. Steel Bars are selling at 1.65c. to 1.75c., Chicago, a sale of 1000 tons being reported at the lower price named for delivery within three months. Large consumers are making inquiries for the last half of the year, and it looks as if contracts would soon be made by them, even if present rates have to be paid. Hoops are firm at 2.05c., Chicago, base, for Bands, but business is quiet and will probably be until the trade realize that the figures are firm. Jobbers report quite an active demand from stock, with assortments badly broken on account of the stoppage of so many of the Iron mills. They quote Bar Iron at 1.85c., while Soft Steel Bars are selling at 1.75c. to 1.80c. Norway and Swedish Iron are quoted at 3.20c. to 3.25c. to the best trade, and 3.50c. for small lots.

Car Material.—Business in this line is comparatively quiet, as few orders for cars are now being placed.

Structural Material.—The Chicago Drainage Canal Trustees will award the contract for a 3000-ton bridge this week. Several small buildings are also coming up for action, but nothing else of importance has transpired. The demand for small lots is very good and stocks are running short in some of the local yards. Prices are firmly held. Mill shipments are quoted as follows, Chicago delivery: Beams, 18 inches and over, also Angles under 3 and over 6 inches, 1.75c. to 1.85c.; Beams and Channels, 15 inches and under, and Angles 3 to 6 inches, 1.65c. to 1.75c.; Tees, 1.70c. to 1.80c.; Universal Plates, 2.15c. to 2.25c. Store prices are from ¼c. to ½c. above these prices.

Plates.—Manufacturers report a continuous demand which cannot be satisfied because early deliveries cannot be made. The local mills are unable to take any more business this year involving large tonnage, and are only able to handle such special trade as is particularly desirable. Sales have been made up to 2.40c., Chicago, for mill shipments of Tank Steel, for delivery in three months. Prices on every kind of Plates depend entirely on the special arrangements which may be made with mills.

Merchant Pipe.—Manufacturers have advanced mill shipments of Merchant Pipe to three 10's and 5 per cent. off. Some orders are being taken at this price, but trade is comparatively quiet. Merchant Boiler Tubes are quoted in small lots 1¼ to 1½ inch, inclusive, 40 per cent. off for Iron and 45 per cent. off for Steel; 2 to 2½ inch, inclusive, 52½ per cent. off for Iron and 57½ per cent. off for Steel; 3-inch and larger, 60 per cent. off for Iron and 62½ per cent. off for Steel, with an extra of 5 per cent. for carload lots.

Sheets.—Considerable business could be placed in Black Sheets if the mills were taking orders, but at present almost all of them are out of the market. Those who are quoting ask 2.90c. to 2.95c., Chicago, for mill ship-

ments of No. 27 Black. Galvanized Sheets are in good demand, with mills quoting 70 and 10 to 75 per cent. off. Some of the jobbers are advancing their prices for small lots from stock and now quote 3.15c. for No. 27 Black, but others continue to sell at 2.90c. Wood's Smooth has been marked up to 3.35c., and Galvanized at 70 and 5 to 70 and 10 per cent. off.

Merchant Steel.—The time is approaching when yearly contracts will be made by agricultural implement makers, and from present appearance they will have to pay considerably more than last year or for several years. The mills occupy a very strong position, and it is believed that buyers will have to come to their terms. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery Steel, 2.40c. to 2.50c.; Smooth Finished Tire, 2.20c. to 2.30c.; Open Hearth Spring Steel, 2.40c. to 2.50c., base; Toe Calk, 2.40c. to 2.50c., base; Ordinary Tool Steel, 5.50c. to 7c.; Specials, 10c. and upward. Jobbers are quoting small lots from stock at 2.70c. for Tire, 2.90c. for Machinery, 2.90c. for Spring, and 2.90c. for Toe Calk, full extras.

Billets and Rods.—No sales of Billets are reported, but consumers would be obliged to pay about \$28, based on prices at Eastern mills. The local manufacturers of Wire Rods had a few hundred tons released by buyers in the past week and immediately sold them at \$35.

Rails and Track Supplies.—Sales of 6000 tons Standard Sections are reported for late delivery. The local manufacturers now will take no orders for delivery this side of November. They continue to quote Standard Sections at \$26 to \$28, according to quantity. Light Rails have been sold in small quantities, most business being done by outside mills, the local manufacturers being sold up to August. Light Weight Sections are quoted at \$30 to \$37, according to weight. Track Supplies are quoted as follows: Splice Bars, 1.40c. to 1.50c.; Spikes, 2.10c. to 2.15c.; Track Bolts, with Hexagon Nuts, 2.65c. to 2.75c.; Square Nuts, 2.55c. to 2.65c.; Steel Links and Pins, 2.15c. to 2.20c.; Iron Links and Pins, 2c.

Old Material.—Transactions are limited and nearly all business now being done is with dealers who have contracts which they are filling. Some small lots of Old Iron Rails have changed hands, and a fair demand from foundries is reported for Cast Scrap. Dealers' selling quotations are as follows, per gross ton: Old Iron Rails, \$18; Old Steel Rails, mixed lengths, \$11.50; Selected Long Lengths, \$13 to \$13.50; Relaying Rails, \$18 to \$19; Old Car Wheels, \$14.75 to \$15; Heavy Melting Steel Scrap, \$10 to \$10.50; Mixed Steel, \$8.50. The following selling prices are per net ton: No. 1 Railroad Wrought, \$16 to \$16.50; Dealers' Forge, \$12.50; Fish Plates, \$16; No. 1 Mill, \$9 to \$9.50; Heavy Cast, \$12 to \$12.25; Stove Plates, \$7.50; Iron Car Axles, \$16.50; Horseshoes, \$11.50; Cast Borings, \$5.50 to \$6; Steel Axle Turnings, \$8.25; Iron Axle Turnings, \$9; Machine Shop Turnings, \$7.

Metals.—Lake Superior Copper is a little easier, carload lots being now quoted at 19.50c. Western Copper, on the other hand, is a little stronger and held at 18¼c. Spelter is firm at 6.60c. Pig Lead is stronger, as the production is now so well controlled, and refiners are quoting 4.37½c.

Tin Plate.—A much better demand is noted, with jobbers experiencing some difficulty in securing deliveries from the mills as rapidly as their trade requires. Prices are unchanged.

The Hawley Down Draft Furnace Company have moved their offices and works to corner of Townsend and Superior streets, Chicago.

Philadelphia.

Office of The Iron Age, Forrest Building,
PHILADELPHIA, PA., May 9, 1899.

The trend of the market appears now to be toward higher prices. For a month or more there has been some degree of hesitancy, and for a while it looked as though buyers might do better during the last half of the year, but as the time approaches the chances in this direction do not improve. One reason for this is that order books do not thin out, and as week succeeds week manufacturers find they are just as far behind as they have ever been, and with supplies scarce, and cost increasing they are in no mood for considering lower prices. Of course, everybody recognizes the enormous output, but so long as "it all goes," what is the use of talking about overproduction? One fact is worth more than a hundred theories, and the fact of a demand in excess of supply is at this time too evident to require argument. Consumers are more inclined to recognize this feature than they have been, but they are not fully prepared to act on it, but are just waiting until the movement begins. At a

price they would place orders, and a good deal of capital is being made out of a few furnaces that are offering Cinder Iron at \$13.50 to \$14, at furnace, but we have yet to find any standard Iron that has been affected in the slightest degree. On the contrary, there is increased firmness. May and June shipments are at a slight premium, while July and later months are not shaded as might have been done during April. This does not necessarily indicate that prices are bound to be higher, or that they cannot be lower, as a great many totally unforeseen things might happen before midsummer, but what we are endeavoring to show is, the tendency of the market from week to week. In finished products the feeling is much the same as in Pig Metal. Mills make no headway in reducing the amount of work under contract. There are changes, of course—some may have more business of a certain class, others lose a little in some other class, but the average is fully maintained, and as buyers are beginning to be very urgent for prices for the last half of the year manufacturers are compelled to take some definite position. For a while the disposition was to enter orders liberally so long as deliveries were far enough ahead, but there is more hesitancy now. Some come out squarely for higher figures, others decline to commit themselves to anything unless to protect a valued customer, in which case prices are purely a matter of private arrangement. Under these conditions it is no doubt safe to say that whatever the outcome may be, appearances for the near future indicate an improving market.

Pig Iron.—The market is a little irregular, but on the whole prices are firm. Several nearby furnaces which have recently been put into operation are offering Cinder Iron at what appear to be very low figures, and prices quoted for these Irons are used against standard makes, which, however, have not been affected, as they are so close sold up, and Iron is in such good demand that makers are inclined to ask an advance rather than consider a reduction. With the exception named the market is very strong, and prospects are far from encouraging to those who may be looking for lower rates. Serious attention is now being given to prices for the last half of the year, and while buyers show some hesitancy in placing orders at prices usually quoted, makers appear to be confident that values will be maintained, and are not inclined to accept business at anything less than the figures recently quoted, and in some cases they are asking a trifle more. Sales have not been specially important during the past week or two, because of the supposed uncertainty of the situation, but recent indications lead to the opinion that buyers will place large orders pretty soon, as abstention from buying has not had the effect of weakening prices, as would have been the case if there was any real weakness in the situation. Today's prices for seaboard or equivalent deliveries are as follows: No. 1 X Foundry, \$16.50 to \$17; No. 2 X Foundry, \$15.75 to \$16.25; Plain, \$15.25 to \$15.50; Standard Mill Iron, \$15 to \$15.25; Cinder Irons, \$14.25 to \$14.50; Basic, \$15 to \$15.25; Low Phosphorus, \$19 to \$19.50, according to points of delivery.

Billets.—There is very little business being done, Steel being scarce and prices higher than buyers like to pay. A sale was reported at something over \$29 late last week, but since then very close to \$28.50 has been done for a pretty good sized lot. It is difficult to define the exact situation as regards prices, because of the scarcity of material, but it is the general impression that prices will be maintained until midsummer, if not during the entire fall months.

Plates.—The demand keeps well up to the average of the past several months, and from present appearances it is likely to continue indefinitely. All the varied interests that require Plates are steady buyers, and manufacturers are beginning to stiffen up on long deliveries, as there is a growing impression that prices will be higher as requirements for the fall trade are presented. Meanwhile last week's prices may be repeated, as follows: 2.20c. to 2.30c. for ¼-inch and thicker; Shell, 2.35c. to 2.40c.; Flange, 2.50c.; Fire Box, 2.60c.

Structural Material.—There is a good demand and mills are in their usual condition of activity. There are no orders of special importance, but the run of day to day orders in connection with the large amount of work on the books seem to insure a condition of almost unprecedented activity during the summer months. Prices are as follows for seaboard delivery: Angles, 1.63c.; Beams, 15-inch, 1.63c.; Tees, 1.68c.; Zee Bars, 1.68c.; Bulb and Deck Beams, 1.83c.

Bars.—Mills are very full of work, and are somewhat unwilling to enter much more under present conditions, particularly if long deliveries are required. Options of sale have been given on nearly all the Eastern Bar mills, and until these are accepted or declined the owners are

not willing to accept much new business. Meanwhile sales are usually at prices about as follows for seaboard or equivalent points: Ordinary Bars, 1.45c. to 1.50c.; Refined Bars, 1.55c. to 1.65c.; Test Bars, 1.70c.; Steel Bars, 1.80c. to 1.90c.

Sheets.—The demand is quite active and includes all the various numbers, as a considerable scarcity is reported in the West. Mills are running to their full capacity and will no doubt continue to do so as long as the weather will permit. Sales at about the following figures for best makes (Common Sheets two-tenths less): No. 10, 2.60c.; No. 14, 2.70c.; No. 16, 2.80c.; Nos. 18-20, 2.90c.; Nos. 21-24, 3c.; Nos. 26, 27, 3.10c.; No. 28, 3.20c.

Old Material.—There is a somewhat steadier feeling in the market, holders as a rule having refused to make concessions except under special circumstances. Bids and offers for lots delivered in buyers' yards are about as follows: Cast Borings, \$10.25 to \$10.50; Wrought Turnings, \$11.25 to \$11.75; Machinery Cast, \$12.50 to \$13; Old Car Wheels, \$15 to \$15.50; Heavy Steel Scrap, \$12.75 to \$13.25; Steel Rails, \$14 to \$15; Iron Rails, \$18 to \$19; No. 1 Railway Scrap, \$17.50 to \$18; Iron Axles, \$21 to \$22; Steel Axles, \$16.50 to \$17.50.

Cleveland.

CLEVELAND, OHIO, May 9, 1899.

Iron Ore.—The strike of grain shovelers at Buffalo and the attendant tie up of a fair sized portion of the lake fleet has as yet affected the movement of Iron Ore but very indirectly, although the consequence of its continuance for any very prolonged period might prove much more serious. Many of the large Steel freighters are under contract to carry cargoes of grain upon the first two or three trips after the opening of navigation, and any delay which they may encounter at Buffalo at the end of each down trip will, of course, entail a corresponding tardiness in their undertaking the fulfillment of their Ore carrying contracts. The late opening of navigation and the general prospects of a prosperous season have only served to strengthen the vessel owners in the opinion that the best policy is to hold their boats free to take chances on "wild" rates. As a consequence no further contracts covering the movement of Ore for the season have been reported. All single trip charters for the transportation of Ore from Escanaba which have thus far been made have been on the basis of 50 cents, while the Lake Superior contract rate of 60 cents has also prevailed in the case of almost all the early charters from ports at the head of Lake Superior. If, however, the Iron Ore shippers have had little fear of the results of the labor troubles at Buffalo, there have developed indications that they may not be able to dispose of the feeling of uneasiness among the Ore unloaders quite as amicably as was originally anticipated. The trouble arises from a difference in the rates of pay at different ports. Some time ago the men at all Lake Erie ports received a uniform advance of 1 cent per ton. This makes the rate paid at Cleveland 11c. per ton for unloading from boats, and 7c. for loading from docks to cars, while at the other Lake Erie ports of Ashtabula, Conneaut, Fairport, Lorain and Huron, Ohio, the rate paid since the advance is 10c. for unloading from boats and 5½c. for loading from docks to cars. A movement started by the longshoremen's union at Ashtabula bids fair to spread to the other ports and a general demand for universal payment of the maximum price is looked for. The first boats to arrive at Lake Erie with Ore cargoes and which would under ordinary circumstances probably have gone to Ashtabula, were diverted to other ports for fear that a strike would be precipitated, but at a meeting between the dock managers and representatives of the union it was agreed that the managers should be given two weeks in which to arrive at a decision, and pending the expiration of this time the handling of Ore cargoes is proceeding as usual. Sentiment on the part of the dock interests seems to be quite strong against any advance on the ground that expenses have been considerably increased this year with no great profit in the business at best. A lack of appreciation of the existent situation at the Lake Erie docks apparently exists in some quarters and is doubtless due in a measure at least to an erroneous impression that has gone out regarding the prevailing system of rebates between the railways, dock companies and furnace companies. The supposition has gained credence that the rebates come out of the charge of 16 cents per ton paid by the vessels for the service attendant upon unloading. This is entirely incorrect, as strictly speaking the vessel has nothing whatever to do with these rebates. The 16 cents per ton which is expended in getting the Ore transferred from the hold of the vessel to the dock is divided between the wages of the Ore unloaders and the expenditure necessarily attendant upon the operation of the docks. The rebates are paid

by the railroad companies and are simply equivalent to a reduction in the rail tariff for the transportation of the Ore, varying, of course, with reference to whether the Ore is placed on the dock or shipped direct to the furnace. The contention which the vesselmen are now making so vigorously with the idea of instituting a reform is that the vessel should simply pay for shoveling the Ore into buckets and not for putting it on dock or into cars. An Ore unloading machine, on the clam-shell bucket plan, which will be tried for the first time this season, when an experimental machine will be installed on the Carnegie docks at Conneaut, may hasten a solution of the difficulty, although the inventor of many improved types of Ore handling machinery maintains his claim that it is impossible to devise a machine which will successfully unload all the Ore from the hold of a modern lake vessel. As might have been expected, sales of Ore during the past week have been infrequent and in only small quantities, where transactions are reported. Pickands, Mather & Co. of Cleveland have purchased the Mikado mine, located near Bessemer, Mich. The Mikado, which was once under the control of the Buffalo (Schlesinger) Mining Company, has not been operated since 1897, and indeed has, all told, shipped only about 25,000 tons of Ore, but the purchasers are making arrangements to work it just as soon as the work of unwatering the property can be completed.

Pig Iron.—The general quietude of the market continues, with, however, the same firm tendencies which have been manifest for some time past. The quotations continue in force for all grades. Furnacemen are, however, quite conservative in making sales at present prices. Fair sales of Foundry Iron have been made for both third and fourth quarter delivery, but sales of Bessemer are lighter, particularly for the closing quarter of the year. Sales of some magnitude in both grades may be anticipated within a short time.

Finished Material.—The past week has brought out a most active inquiry for Structural Material, and the local sales office of the Carnegie Steel Company reports the sale of 3000 tons for local consumption. The inquiry for Bars is also good, but few sales are reported. Little is doing in Plates and few if any sellers are willing to make quotations.

Old Material.—The situation shows no improvement either in the matter of demand or supply and quotations show but a slight fluctuation. Sales have been reported as follows: Steel Melting Stock, \$13.50; No. 1 Wrought, \$16; No. 1 Cast, \$12.50; Iron Rails, \$19; Car Wheels, \$16.50; Cast Borings, \$9.50; Turnings, \$10.75.

Cincinnati. (By Telegraph.)

Office of The Iron Age, Fifth and Main streets, CINCINNATI, May 10, 1899.

There has been some further buying of Southern Mill Irons, with the result of cleaning up the market of offerings of that class and also materially strengthening this, which was the softest spot some few weeks ago. Gray Forge warrants have also been selling and at a good advance on asking price of three weeks ago. Gray Forge is now quiet and strong at to-day's quotation. Soft Irons are in fair demand and quite strong, and scarce as well. There has been a fair volume of trading in Foundry grades, and, while nothing especial in the way of buying is looked for soon, yet there is every reason to expect a steady business for some time to come. The situation is very strong and higher prices are not at all improbable. The activity in Mill Irons is thought to be over for the present. There is no change in prices, and at to-day's quotations the market is strong and steady. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1.....	to \$15.00
Southern Coke, No. 2.....	to 14.50
Southern Coke, No. 3.....	to 14.00
Southern Coke, No. 1 Soft.....	to 15.00
Southern Coke, No. 2 Soft.....	to 14.50
Southern Coke, Gray Forge.....	to 13.25
Southern Coke, Mottled.....	to 13.25
Ohio Silvery, No. 1.....	\$16.75 to 17.25
Ohio Silvery, No. 2.....	16.25 to 16.75
Lake Superior Coke, No. 1.....	16.25 to 16.50
Lake Superior Coke, No. 2.....	15.75 to 16.00

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$15.75 to \$16.25
Lake Superior Car Wheel and Malleable..	16.50 to 17.00

Plates and Bars.—Prices are unchanged and strongly maintained. Everything is active and favoring the seller. Quotations, f.o.b. Cincinnati: Bars, wholesale, 1.60c., with half extras; Bars, retail, 1.75c., with full extras; Bar Angles, 1.75c., wholesale; Plates, 2½c. for ¼-inch and heavier; Sheets, No. 27, 2.85c.; No. 10, 2.40c.

Old Material.—Market is quiet and not quite so strong. Axles are weaker. Quotations, f.o.b. Cincinnati: No. 1 Wrought Railroad Scrap, \$14 to \$14.50 per

net ton; Cast Scrap, \$10.50 gross; Car Wheels, \$14 gross; Iron Axles, \$18 net; Iron Rails, \$16; Steel Rails, \$11.

Pittsburgh.

Office of The Iron Age, Hamilton Building, Pittsburgh, May 10, 1899.

(By Telegraph.)

Pig Iron.—The Valley furnaces have fixed the price of Bessemer Pig for third quarter at \$15 at furnace, and we note a sale of 10,000 tons for May, June and July shipment at that price. This sale cleans up all the Iron available for this side of July, and it is not believed that a great deal can be bought even for the third quarter. The Valley furnaces have complete control of the Bessemer Pig market, and it is strongly intimated that the price will be advanced again before long. With the Steel market close to \$27 it is figured that the spread between Pig and Steel is too great and that Pig must go up. The sales of some 30,000 to 40,000 tons of Southern Forge noted last week have strengthened the local market on Forge, and the price to-day is strong at \$14.75, Pittsburgh. Foundry Irons are also stronger, and No. 2 is quoted at \$15 to \$15.25. In fact, the entire Pig Iron market is stronger than last week and prices are higher. We quote Bessemer Pig at \$15; Gray Forge, \$14 to \$14.25 at Valley Furnace; No. 2 Foundry, \$15 to \$15.25; Gray Forge, \$14.75; Bessemer, \$15.65, all f.o.b. Pittsburgh. We note a sale of 1500 tons of Gray Forge at \$14.65 and 300 tons at \$14.75, Pittsburgh. Also a sale of 100 tons of No. 2 Foundry at \$15, Pittsburgh.

Billets.—There have been heavy transactions in Billets in the past week. The American Steel & Wire Company are understood to have bought very heavily, while the American Steel Hoop Company are said to have covered their entire requirements for the last six months of the year. The tonnage was divided between Pittsburgh, National and Federal. As to the quantity involved it is difficult to state, some putting it at 100,000 tons, while others say it is over 200,000 tons. Outside of the above we have not heard of a single local transaction. Some lots of Steel have been sold for delivery in other districts at prices which are said to have figured out about \$27, Pittsburgh. The heavy sales noted above, however, were probably considerably under that price.

Sheet Bars.—A sale of 3000 tons of Sheet Bars is reported on the basis of \$26.75, delivered, Pittsburgh. Bars are being quoted at \$26 to \$26.50, maker's mill.

(By Mail.)

The week has been an eventful one. Full details of the consolidation of all the interests of the Carnegie Steel Company, Limited, and the H. C. Frick Coke Company are set forth in another part of this issue. The merging of the interests of these two great concerns is going to have a far reaching effect on the Iron trade, and brings into more compact form the great Steel industry of the United States. While a working arrangement will probably be made between the new Carnegie Company, the Federal Steel Company, the National Steel Company and the American Steel & Wire Company, a consolidation of the interests of these four large Steel concerns is not contemplated at this time. We have official knowledge to this effect. The Steel business of the United States, and it also might be added, of the world, is now in the control of these four concerns. With plans now under way, it is not likely that a piece of desirable Ore property in any of the regions has been overlooked, but is all under control in one shape or another. This makes it practically impossible for outside capital to get into the Steel business with any degree of success. As to the general effect of this situation upon the market at large, we already have knowledge of one concern, and there are doubtless others, that have given up the intention of engaging in the manufacture of Iron and Steel in finished forms, for the reason that there would be difficulty in securing a supply of Steel. The situation at present is a good deal mixed, but after the smoke clears away it will be seen that the new Carnegie Company will have the largest capitalization and the best works in the world for the production of cheap Steel. Considerable credit is due to the master minds that have engineered this great project. Aside from the Carnegie Company deal

the event of most importance has been the purchase of round lots of Billets for delivery in second half of the year by the American Steel & Wire Company and one other smaller consumer. The exact tonnage involved in these two large purchases has not been given out, but it probably aggregates not less than 250,000 tons, and may be double that amount. These sales practically fix the price of Steel for the last half of the year, and on a very high basis. The move for the consolidation of the Sheet mills is making progress, but, like all undertakings of this kind, a good many snags have been met, which will have to be overcome before the deal can be consummated. Already a number of options have been given to Isaac W. Frank, who has this matter in charge. It is intimated that a leading Steel producer will come into the market this week or next week and make a purchase of a round lot of Bessemer Pig for delivery in second half of the year, and at an advance over present prices. The whole situation in the Iron trade is exceedingly strong, with prices firm and the tendency altogether to higher figures. This week additional details relating to the merging of the interests of the Carnegie and Frick interests will probably be available, and these will doubtless have considerable effect on the general situation.

Ferromanganese.—There is not much inquiry, except for small lots. The local producer continues to quote at \$75 for large lots.

Plates.—Prices on Plates are exceedingly strong and round lots of Tank have been sold at 2.10c. and Flange at 2.35c., Pittsburgh, for shipment over the next three or four months. The order for Plates for the Government floating dry dock to be located at Algiers has not yet been placed by the Maryland Steel Company, who are the contractors, and they are having difficulty in getting it placed satisfactorily. It will take about 4000 tons of Plates for this work. Inquiries for 3000 or 4000 tons of Boat Steel are in the market and will probably be placed this week. Considerable other additional work is also being figured on, and it is probable that considerable tonnage will be placed in the next week. The leading local mill is practically out of the market on Plates to August or longer, while several of the smaller mills are also sold up for the next three or four months. Where a mill is in position to make reasonably early deliveries on Plates buyers have to pay a premium on the price. We quote Tank Plate, ½-inch and heavier, 2.10c. to 2.25c., depending on the order and delivery wanted; Shell, 2.25c. to 2.30c.; Flange, 2.35c. to 2.40c.; Marine, 2.50c. to 2.60c.; Fire Box, 2.50c. to 3.25c., depending on quality.

Sheets.—We are advised that satisfactory progress is being made in the matter of consolidating the Sheet mills. Of course the usual difficulties have been encountered which are always met in an undertaking of this kind, and we also understand that some of the leading Sheet mills have not as yet given options on their plants. It is believed that the consolidation will ultimately be effected, though it may take considerable time yet. In the meantime buyers of Sheets are trying to cover for last half, while most of the mills refuse absolutely to sell for any delivery. There is a very heavy inquiry, one local mill refusing to quote in the last few days on 3000 to 4000 tons. With this condition prices are naturally very strong. Sales of good sized lots of No. 27 Sheets have been made on the basis of 2.70c. and No. 28 at 2.75c. In some cases, we are advised, still higher prices have been paid. We quote Black Sheets, box annealed, one pass through cold rolls, for delivery in the next two or three months, at 2.70c. to 2.75c. for No. 27 and 2.75c. to 2.80c. for No. 28. Sheets for early delivery have sold at higher prices. The situation in Galvanized Sheets is also very strong. Stocks are being depleted fast and buyers are compelled to come into the market and place orders for their requirements. Prices are unchanged, and we quote Galvanized Sheets at 75 per cent. off, with 15c. freight allowance. We are advised that some mills are quoting 70 and 10 per cent. off.

Structural Material.—There is a good, steady demand for Structural Shapes, but mostly for small lots ranging from 100 to 500 tons. Both local mills are fully employed. We quote Beams and Channels, 3 to 15 inch, 1.50c.; 18, 20 and 24 inch, 1.60c.; Zees and Angles, 1.50c.; Tees, 1.55c.; Universal and Sheared Plates, 2.10c. to 2.25c., depending on the order.

Bars.—The tonnage in Iron Bars placed in the past week has been light, owing largely to the fact that most of the mills are in the process of being absorbed by the Republic Iron & Steel Company. For this reason a good deal of business has been held off, which will likely be placed after the new concern gets in good working order. We quote Iron Bars at 1.50c. to 1.60c. at mill, half extras. There is a good demand for Steel

Bars and prices are strong. Considerable tonnage has been entered in the past week by local mills. We quote Steel Bars at 1.65c., at mill, half extras.

Spelter.—The market is very firm. We quote prime Western grades at 6.75c., Pittsburgh.

Merchant Steel.—The mills are full of work and considerably behind in deliveries. There is a good tonnage going, with buyers compelled to pay material advances for early delivery. Some mills are so well filled up that they are declining to take additional tonnage. We quote in carload lots, f.o.b. Pittsburgh: Open Hearth Machinery, 2.15c. to 2.25c.; Open Hearth Spring, 2.50c. to 2.75c., depending on the order; Pick Steel, Open Hearth, 3.25c.; Open Hearth Plow Slabs, 2.50c.; Tire Steel, 2.10c. to 2.25c.

Pipes and Tubes.—There is a fair demand for Merchant Pipe, but it is not as active as it was some time ago. It is reported that there is an inquiry in the market for about 200 miles of 10-inch Line Pipe for a company who propose to pipe gas from the West Virginia fields to Cincinnati and other Western cities. Prices on Merchant Pipe have again been advanced, and we quote at 60 and three 10's in small lots, f.o.b. maker's mill, and 60 and three 10's and 5 in carload lots, delivered. There is a heavy demand for Casing, and prices on both Screw and Socket and Inserted Joint have been advanced. We quote Screw and Socket at 50 per cent.; Inserted Joint, 45 per cent., with an extra 5 per cent. to dealers. There has been no change in price of Boiler Tubes, but the market is very firm. We quote 1¼ to 1½ inch, Iron or Steel, 45 per cent. off list; 1¾ to 2½ inch, Iron, 55 per cent.; Steel, 60 per cent.; 2¾ to 6 inch, Iron, 60 per cent.; Steel, 62½ per cent., with 5 per cent. discount to dealers.

Iron and Steel Skelp.—Skelp is difficult to get at any price, the mills being filled up with tonnage. Prices are very firm, and we quote Grooved Steel Skelp at 1.70c. to 1.75c.; Sheared Steel Skelp, 2.10c. to 2.25c.; Grooved Iron Skelp, 1.70c. to 1.75c.; Sheared Iron Skelp, 1.90c. to 2c., all f.o.b. Pittsburgh.

Connellsville Coke.—There is a continued heavy demand for both Furnace and Foundry Coke, and shipments from the Connellsville region are the largest ever known. As noted last week, most of the blast furnaces have covered in Coke for the last half of the year. Furnace Coke is scarce and is being quoted at \$2 a ton, with reports of sales at \$2.15 for strictly Connellsville Coke. Foundry Coke is \$2.15 to dealers and \$2.30 to consumers. Some outside brands of both Furnace and Foundry are being offered at slightly less than the above prices. Production of Coke in the Connellsville region last week was about 170,000 tons.

The Magnolia Metal Company of New York have established offices at Eighth street and Liberty avenue, Pittsburgh, Pa.

St. Louis. (By Telegraph.)

Office of The Iron Age, 512 Commercial Building, St. Louis, May 10, 1899.

Pig Iron.—A normal volume of small orders is being written up by sales agents and at current prices. No heavy transactions are being acted upon, and furnaces still require that specifications be presented to them for price and decision. The middle of the year is not so far off but that consumers are preparing for future negotiations with Pig Iron representatives. The foundrymen of this vicinity have formed the St. Louis Founders' Association, in which nearly all of the local concerns have a representation. The organization is still in its infancy, but has been established for protection and mutual benefit. Prices of Pig Iron remain unchanged and we quote as follows, f.o.b. cars St. Louis:

Southern, No. 1 Foundry.....	\$15.50 to \$16.00
Southern, No. 2 Foundry.....	15.00 to 15.50
Southern, No. 3 Foundry.....	14.50 to 15.00
No. 1 Soft.....	15.50 to 16.00
No. 2 Soft.....	15.00 to 15.50
Gray Forge.....	14.00 to 14.50
Mottled.....	13.75 to 14.25

Bar Iron.—The Bar Iron situation is still unsettled, pending the closing of formalities which will make the new company a single factor in the market. A meeting is now being held in the East which will doubtless result in the completion of all details. The local mill, which has been included in the new company, is still shut down, and the opportunity taken to make such repairs as are ordinarily required in a busy plant. Figures on Bar Iron are not given with an idea of stating mills' quotations, as those entering the large company are not in position to handle new business. We quote nominally Iron Bars at 1.60c., base, half extras, in car-

load lots, St. Louis. Jobbers quote small lots from stock at 1.85c., base, full extras. There can be little doubt that prices will advance within a few weeks, as the foregoing prices are comparatively low.

Rails and Track Supplies.—The regular amount of business is being handled this week and some specifications for future deliveries presented. Weather conditions are favorable and encouraging to contractors and rapid progress made on the various operations in hand. No change in price is felt, and we quote as follows: Splice Bars, 1.60c. to 1.70c.; Track Bolts, with Square Nuts, 2.60c.; with Hexagon Nuts, 2.75c.; Spikes, 2.20c. to 2.30c.; Iron and Steel Links and Pins, 2.20c. to 2.30c.

Pig Lead.—Bearish local influences are noted in this market, but holders show no anxiety to sell. Soft Missouri is quoted at 4.32c. and Desilverized at 4.35c., but no transactions reported. Lead Ore made an advance of 50c. last week and brought \$26 per 1000 lbs.

Spelter.—There is little change in the general condition of Spelter, although it is held at 6.75c. per lb., showing an advance of 5c. over last week's prices.

Zinc Ore.—Fifty dollars was the top price for Jack for the week ending May 6, and from advices received we understand that to-day's top price of Ore at Joplin is \$49 per ton. This shows a decline of \$4.50 per ton since May 1, but prices for the balance of this week may be more favorable to the miners.

The Gautier department of the Cambria Steel Company of Johnstown, Pa., has recently opened a branch office at 1516 Chemical Building, St. Louis, under the charge of H. P. Hubbell as sales agent, all sales in this territory being under his direction. The Gautier department makes Tire, Plow, Toe Calk, Spring, Cold Rolled, Ordinary and Smooth Finished Machinery Steel, in addition to other specialties of this nature.

The Belgian Iron Market.

BRUSSELS, April 23, 1899.

The position of the Belgian Iron market is becoming more and more brilliant. Unfortunately raw materials like Coal, Coke, Pig Iron and Steel are exceptionally scarce, and it may even be said that they cannot be obtained. Manufacturing Coal has undergone a rise of 2 francs per metric ton from the 1st inst. This advance has been confirmed by the results of the public letting which has since taken place for the Coal supply of the Belgian State Railroad, in which an advance of 2 francs per ton was obtained. This scarcity of Coal is due to the growing demand for industrial purposes, to which must be added the fact that there has been a marked decline in the work done per man. Then our growing export of Coal must be taken into consideration. The State railroads have accorded rates of freight on export Coal and Coke which are considerably lower than those made on imports of the same goods. The situation, difficult as it is, has become more complicated during the last week by the almost general strike of the Coal miners in all the Belgian districts. Although it has only lasted a short time now, stocks have been wiped out and metallurgical establishments have been forced to shut down. This strike is severely condemned by public opinion. The miners demand an increase in wages of 20 per cent., proportionate to the increase in the price of Coal, but wages have all been advanced more than 25 per cent., or in other words at a greater rate than the increase in the price. Consumers have been offered English, German and French Coals, but they would cost the works 24 francs per ton, or 10 to 11 francs more than Belgian Coals. Under these conditions the greater number of rolling mills prefer to stop their works, and several have already shut down in part or entirely. Coke even before the strike was so scarce that several blast furnaces could not be blown in. The result is that Pig Iron is extremely scarce in Belgium, and particularly since the imports of foreign brands are declining owing to the scarcity in other countries. All of them have lessened their shipments with the exception of the United States, which has sent about 3000 tons more for the first three months of the year 1899. You could easily forward to us 100 times more, which Belgium would readily absorb. As will be seen from prices quoted further on we would pay high and remunerative rates.

Steel Billets and Blooms are very scarce, our home producers consuming all they make, while imports have fallen off quite heavily. The United States have completely ceased shipments. As for finished products the position remains a brilliant one. Demand and sales both for home and export delivery are very good. Construction shops are employed beyond their capacity, which has led to lawsuits because they cannot furnish at the time promised. It is nearly the same with Iron and rolling mills and Steel works, who cannot keep up deliveries, hav-

ing accepted so many orders, in spite of the fact that their capacity is being crowded to the extreme.

Below are prices on April 20 and March 20 compared:

	April 20, Francs.	March 20, Francs.
Luxemburg No. 3 Foundry Iron....	70.00 to	70.00 to
Thomas Basic Pig	70.00 to 75.00	65.00 to 67.00
Charleroi Forge Iron.....	65.00 to	65.00 to
Luxemburg Forge Iron.....	60.00 to	60.00 to
No. 2 Bars, f.o.b. Belgian stations...	155.00 to	145.00 to
No. 2 Bars, f.o.b. Antwerp.....	145.00 to	145.00 to
No. 3 Bars, f.o.b. Belgian stations...	160.00 to	140.00 to
No. 3 Bars, f.o.b. Antwerp.....	150.00 to	150.00 to
No. 2 Beams, f.o.b. Belgian stations...	150.00 to 155.00	145.00 to 150.00
No. 2 Beams, f.o.b. Antwerp.....	147.50 to 150.00	142.50 to 145.00
Angles f.o.b. Belgian stations.....	160.00 to	160.00 to
Rails, f.o.b. Antwerp	135.00 to	130.00 to
No. 2 Iron Plates, f.o.b. Belgian stations.....	175.00 to 180.00	170.00 to
No. 2 Iron Plates, f.o.b. Antwerp...	175.00 to	165.00 to
No. 3 Iron Plates, f.o.b. Belgian stations	190.00 to	180.00 to
No. 3 Iron Plates, f.o.b. Antwerp...	185.00 to	175.00 to
Special Iron Plates, f.o.b. Belgian stations	215.00 to 225.00	220.00 to
Special Iron Plates, f.o.b. Antwerp...	210.00 to	200.00 to
Steel Plates, f.o.b. Belgian stations...	190.00 to	185.00 to
Steel Plates, f.o.b. Antwerp.....	190.00 to	170.00 to

New York.

Office of The Iron Age, 232-238 William street, }
NEW YORK, May 10, 1899. }

Pig Iron.—The market is firm but quiet, buyers only contracting for moderate amounts. On the whole this and the New England market are somewhat below the parity of other markets. The principal movement has been in warrants, the sales during the week aggregating about 10,000 tons. Some of them were sold by English holders. The last sales were made at \$10½ for Forge and \$11 for No. 2. We quote as follows: Lehigh and Schuylkill Irons, No. 1 Foundry, \$16.50 to \$16.75; No. 2 X, \$15.75 to \$16; No. 2 Soft, \$15.25 to \$15.50; No. 2 Plain, \$15.25 to \$15.50, and Gray Forge, \$15 to \$15.25. Southern brands are quoted: No. 1 Foundry, \$15.75 to \$16.25; No. 2 Foundry, \$15.25 to \$15.75; No. 1 Soft, \$15.25 to \$15.50; No. 2, \$15 to \$15.25, and Gray Forge, \$14 to \$14.50.

Steel Rails.—The mills do not report any sales of any moment either for domestic or foreign account. The quotation for large lines remains \$25 for Standard Sections.

Track Fastenings.—We quote: Angle Bars, 1.35c. to 1.40c.; Spikes, 1.70c. to 1.80c., and Bolts and Nuts, 2.10c. to 2.20c.

Finished Material.—A large amount of work is coming up in Structural Material in this section. Among the contracts taken are 900 tons for the Loeser Building and 1000 tons for the Moss Building in Brooklyn, 1500 tons for the Hoe Building and a round lot for the National Lead Building. Prices continue very strong. We quote as follows: Beams, 1.63c. to 1.75; Angles, 1.55c. to 1.60c.; Universal Mill Plates, 2c. to 2.15c.; Tees, 1.70c. to 1.75c.; Channels, 1.63c. to 1.75c. Steel Plates are 2.20c. to 2.25c. for Tank, 2.30c. to 2.40c. for Shell, 2.45c. to 2.50c. for Flange, 2.55c. to 2.60c. for Fire Box and 2.60c. to 2.75c. for Locomotive Fire Box, on dock. Refined Bars are 1.50c. to 1.60c., and Common Bars are 1.40c. to 1.50c., on dock. Soft Steel Bars, 1.50c. to 1.55c.; Steel Axles, 2c. to 2.10c.; Scrap Axles, 1.90c. to 2c.; Links and Pins, 1.65c. to 1.70c.; Hoops, 1.75c. at mill; Best Iron Boiler Rivets, 2.25c. to 2.50c., delivered; Steel Structural Rivets, 1.85c. to 1.90c.; Cotton Ties, 95c. a bundle at mill.

Metal Market.

Office of The Iron Age, 232-238 William street, }
NEW YORK, May 10, 1899. }

Pig Tin.—Since our last writing the market here has declined regularly from day to day, and prices have come down from 25.85c., which was the lowest quotation of a week ago, to 25.30c. to 25.40c., which was the closing price quoted to-day. The market to-day is dull and easy. Demand is very light, and owners are willing to meet the slight inquiry which exists. The London market declined from £117 17s. 6d., which was the closing price last week, to £115 10s. for spot and £116 5s. for futures at the close to-day. There is no especial reason given for this decline, and the only excuse made is the dull condition of the metal trades generally.

Copper.—The market here was very dull and easy. Spot Lake is now nominally quoted 19c., while futures are obtainable at 18½c. Electrolytic Cakes, Wire Bars and Ingots are quoted at various figures, ranging from 17½c. to 17¾c. Casting stock is quoted 17½c. There is practically no spot business going through, and it is generally admitted that consumers are well supplied up to the third quarter. It is stated that certain manufacturers have bought up to December. There is no apparent inclination to buy futures at the present figures. Lake navigation will be in full swing in a very short

QUOTATIONS OF IRON STOCKS DURING THE WEEK ENDING MAY 10, 1899.

Cap'l Issued.		Sales.	Thursday.	Friday.	Saturday.	Monday.	Tuesday.	Wednesday
\$47,100,000	Am. S. & W., Common.....	207,093	68 -72	67 -71½	67½-69	63½-67	61½-65½	63½-67½
88,150,000	Am. S. & W., Pref. (7% Cu.)....	12,690	99½-100	99 -99½	98½-98½	98 -98½	96½-98½	96½-97½
9,250,000	Col. Fuel and Iron.....	14,590	50½-51½	50 -51½	48½-49½	46 -48	44 -48½	44 -47½
46,484,300	Federal Steel, Common.....	243,495	66 -68½	66½-68½	64 -66½	59 -64	58½-62½	59½-63½
53,253,500	Federal Steel, Pref. (6% Non-Cu.)	52,155	84½-90½	84½-85½	83½-84½	79 -83	79½-82½	80½-83½
20,000,000	Tennessee Coal and Iron.....	42,852	60½-62½	60½-63	60 -61½	59 -60½	56 -60½	57 -60
.....	Cambria Iron, Phila.*.....	450	44½-45	44 -44½	44 -44½	.....	44	44
5,000,000	Cambria, Steel***.....	38,931	18½-20½	18½-19½	18½-19	17½-18½	17½-18½	17½-18½
1,500,000	Penna. Common, Phila.....	1,235	80 -85½	76 -8½	78½-79	80	76 -76½	.....
.....	Penna. Pref., Phila.....	.....	.....	.....	.....	.....	.....	.....
28,000,000	Tin Plate Common, New York..	18,530	45½-47½	45½-46½	44½-45½	39 -44	40 -43½	40½-43
18,000,000	Tin Plate Pref., N.Y. (7% Cu.)..	2,250	-91	90 -90½	90 -90½	88 -90	-88	87½-88
28,000,000	Tin Plate Com., Chic.....	7,095	45½-46½	-45½	44½-45½	41½-43	40 -42½	40½-41½
18,000,000	Tin Plate Pref., Chic. (7% Cu.)..	1,950	-90	-90	-90	89 -90	-88½	85 -89
32,000,000	National Steel Common, Chic.....	20,754	59 -61½	59½-60½	57½-58½	52 -58	47½-54½	49 -53
27,000,000	National Steel Pref., Chic. (7% Cu.)	3,647	91 -91½	90½-91	90½-91	87 -89	87½-90	87½-90
32,000,000	National Steel, Common, N.Y.....	39,835	58½-61½	59 -60½	58 -59	52½-57½	47½-54½	49½-53
27,000,000	Nat'l Steel, Pref., N.Y. (7% Cu.)	7,955	91 -91½	91 -91½	90½-91	89½-90½	87½-90	87 -89½
7,500,000	Bethlehem Iron**.....	310	-105½	.....	.....	-100	.....	-102
.....	Bethlehem Steel Rights.....	7,977	23 -23½	22½-23	22½-22½	20½-22	21½-22	22 -22½
12,500,000	Pressed Steel, Common.....	3,490	54 -55	-54½	54 -54½	52½-55½	51½-52½	52 -54
12,500,000	Pressed Steel, Pref. (7% Non-Cu.)	991	-84½	84½-84½	.....	-83	81½-82	.....
19,000,000	Am. Steel Hoop, Common.....	9,690	39½-40½	39 -39½	39 -39½	35 -40½	27 -35½	28 -34½
14,000,000	Am. Steel Hoop, Pref. (7% Cu.)..	5,235	82 -83½	82 -83	81 -82	78½-80½	.....	74½-76

* Par \$50. ** 6% guaranteed by B. S. Co. *** \$1.50 per share paid in. Late Philadelphia and Chicago sales by telegraph.

Bonded Indebtedness: Am. S. & W., \$730,000; Am. Tin Plate, none; Am. Steel Hoop, none; Federal Steel Co., \$13,300,000; Illinois 5% \$4,717,000; E. J. E. R. R. 5% \$1,600,000; Johnson 8% \$5,732,000; D. & I. R. R. 5% \$1,000,000; 2d D. & I. R. R. 6% \$10,000; land grant D. & I. R. R. 5% \$1,561,000; National Steel, \$1,561,000; Tennessee C. I. & R. Co. \$3,367,000; 6% \$1,114,000; 7% \$1,000,000; 7% cu. pref.; Pennsylvania Steel: \$1,000,000; Steelton 1st; \$2,000,000 Sparrow's Point 1st, \$4,000,000 consolidated, both plants; Bethlehem Iron, \$1,351,000.

time, and it is hoped that this will bring prices down a shade. A decline of any moment is not looked for, however, and parties prominent in the trade look for a steady business on a basis of something like 18½c. in a short time. The trade express considerable eagerness to ascertain just what the outcome of the Amalgamated Copper Company will be. Thus far it has been looked upon as a blind pool, as all efforts to find out just who the constituent companies are and to what extent these companies are interested have failed. Those who are in a position to know state that this information will be given out within a short time. Allotments of the stock have been made on a basis of about 20 per cent. of the amount subscribed for. A call for money will be issued to-morrow, the cash being payable to the National City Bank on the 20th instant.

Exports so far this month amount to only 1083 tons, while the imports during the same period amount to no less than 1014 tons. These figures show that we have received practically as much as we have shipped. The London market shows a steady dullness for spot, but a very weak market for futures. The discount on futures has now reached 1 pound 15 shillings. To-day's closing London quotations were £76 12s. 6d. for spot and £74 17s. 6d. for three months' futures. Best Selected remains unchanged at £80.

Pig Lead.—This metal was firm throughout the entire week, and advanced to 4.47½c., but is somewhat easier at the close and is now quoted 4.45c. Shipments are said to be obtainable at this figure. The St. Louis market is comparatively firmer, quoting 4.27½c. for Common and 4.35c. for Corroding. The London market has gained a little strength and was quoted at the close to-day £14 6s. 3d. The Cœur d'Alene strike has assumed a serious aspect. The Bunker Hill and Sullivan properties, which combined have a monthly output of about 1600 tons of concentrates, will not be operated for at least six months, as it will be necessary to construct entire new concentrators. The Empire State, with 800 tons capacity, is also practically out of commission, owing to the labor situation. We are informed that martial law has been declared in Shoshone County, in which these properties are situated, and that the Marshal has ordered that no members of the labor union be employed. This move is being taken seriously by the various labor unions in that section, and there is now talk of a shutting down at Cripple Creek and various other points on a sympathy basis.

Spelter—This metal is still in the peculiar position which it has occupied for some time past, and there is no change in the situation here. Futures, it is said, were obtainable during the last week at 6.80c. Spot figures, however, are holding firm at 6.75c. to 7c. It is stated in London that American imports are going back to this country, and an investigation here corroborates this, as it is said that shipments have already arrived here this week. The St. Louis market after declining to 6.60c. has climbed up again to 6.75c. The London market has advanced 2 shillings and 6 pence, but this was lost again to-day, and the quotation now remains unchanged from last week—namely, £28 10s. Ores are down to \$50 per ton.

Antimony—There is no change and prices remain the same. Hallett's is quoted at 10c. and Cookson's 1c. higher.

Nickel.—The position remains unchanged, prices for Canadian Nickel ranging from 38c. to 40c. for lots larger than 1000 lbs., and 40c. to 50c. for smaller quantities.

Tin Plate.—Business in this market has picked up considerably during the last week, owing doubtless to the very stiff position which is being maintained in the English market. Prices remain unchanged, and those quoted by the American Tin Plate Company are said to be the same as quoted for some weeks past, being on a basis of \$4.05 to \$4.10 for 100-lb. Cokes, New York delivery.

Iron and Industrial Stocks.

A glance at our table will show that the last week has been a very eventful one for those who are interested in industrial securities. Monday and Tuesday brought very heavy declines along the whole line. Aside from the general influences affecting values, it is stated that in Steel stocks there was much realization by parties preparing to invest in the securities of the Carnegie Steel Company, for which it is reported very large subscriptions have already been made. To-day there was a general recovery of prices, but values did not in the majority of cases reach the figures before the break.

International Silver, Common.....	13	to 14
Mich.-Peninsular Car., First 6s.....	113	
Otis Elevator, Common.....	33	
Otis Elevator, Preferred.....	88	
H. B. Worthington, Common.....	55	
H. B. Worthington, Preferred.....	112	
Cramp's Shipyard Stock.....	80	
Pratt & Whitney, Common.....	3½	
Pratt & Whitney, Preferred.....	35	
E. W. Bliss, Common.....	138	
E. W. Bliss, Preferred.....	120	
U. S. Projectile.....	90	
Barney & Smith Car., Common.....	25	
Barney & Smith Car., Preferred.....	34	
Park Steel Co.....	107	
American Car & Foundry Co. Common.....	23	
American Car & Foundry Co. Preferred.....	63	
Republic I. & S., Common.....	22	
Republic I. & S., Preferred.....	62	
Tidewater Steel.....	10½	

As compared with the price of 27½ to 28 a month since, International Silver has now receded to 13 to 14. Transfers of the Republic properties were made to-day. The election of officers is to follow to-morrow. It is reported that C. Warner of King, Gilbert & Warner, Columbus, is to be president, George C. Wick vice-president and J. F. Taylor treasurer.

The Superior Steel Company of Carnegie, Pa., manufacturers of hot and cold rolled strip steel, are erecting an addition to their cold rolling department. The building is 100 feet square and will contain a modern 14-inch cold rolling train, and when completed, about July 1, will give this concern a capacity of 1000 tons per month of cold rolled bright strip steel.

The New York Machinery Market.

Office of *The Iron Age*, 233-235 William street, {
New York, May 10, 1899. }

G. Flett, manager of the works of Dick, Kerr & Co., Limited, London, and Sydney Short, who is now also connected with that firm, sailed from this city for London last Saturday and left behind them orders for machinery amounting to almost \$200,000. We have previously noted in this column the fact that these gentlemen were in this city purchasing this equipment. The specifications, which were sent to various machinery merchants and builders in this section, included more than 200 tools, many of which were large and expensive. There were several lots of four, six and nine tools of a certain size, and in some instances the name of the builder was specified. In this latter case were upward of a dozen Kemp-Smith milling machines, numerous Bliss and Ferracute presses. These were all good sized machines. The largest machines specified were a 24-foot boring mill and a 64-inch swing lathe containing a 37 foot 5-inch bed. There were some 26 lathes of smaller dimensions, a 10-foot boring mill, nine 60 inch swing horizontal mills, six 48-inch radial drill presses, two 60-inch vertical boring mills, a 56 by 72 inch by 10-foot planer, several heavy gear cutting machines and numbers of all other classes of tools required to make up a large machine shop. Besides the machine tools there were several traveling cranes, 12 push cars, 12 freight trucks, babbitting and annealing furnaces, pneumatic hammers and drills, air compressors and a 500-ton hydraulic press. We understand that the bulk of this machinery was placed with Manning, Maxwell & Moore, the Niles Tool Works Company, Bement Miles, the E. W. Bliss Company, the Ferracute Machine Company, the Kemp-Smith Milling Machine Company, Gould & Eberhardt and Walter H. Foster. Pawling & Harnischfeger cranes were purchased. It is said that the material was purchased for the equipment of a large electrical machinery plant which Dick, Kerr & Co. are building in England. The present works of this company are located at Britannia and Lilmarcok. The office of the company is located at 110 Cannon street, London, E. C.

We are informed by excellent authority that Henry G. Morse, Witherspoon Building, Philadelphia, is purchasing machinery for equipping a new shipbuilding plant. It is stated that he has already ordered numerous special tools from Wm. Sellers & Co., Incorporated, and that he has purchased the machinery formerly used at the bridge works of Cofrode & Saylor of Pottstown, Pa. Specifications are now out for other material. Mr. Morse has for some time past been projecting a shipbuilding plant to be built at some point along the Delaware River. The organization of the New York Ship Building Company, \$3,000,000 capital, with Henry G. Morse as president, attested his success in the venture. As far as we can learn at present the site for the new shipyard has not been definitely settled upon as yet, or at least not announced officially. Baltimore, Chester and Camden are fighting for the location of the plant. The latest rumor puts it that the new plant will be located at Edge Moor, Del., and that close relationship will exist between the new company and the Edge Moor Bridge Works. Mr. Morse was formerly president of the Edge Moor Bridge Works and subsequently president of the Harlan & Hollingsworth Company of Wilmington. He retired from the latter position to take up the new shipbuilding project.

In a previous issue we stated in this column that the entire equipment of the Armington & Sims Engine Company's plant at Providence, R. I., was to be sold. We have since learned that this machinery was purchased by Manning, Maxwell & Moore, the Niles Tool Works Company and the A. B. Pitkin Machinery Company. The equipment consisted of a fine lot of large and medium sized tools valued originally at about \$150,000.

In another column we print a notice to the effect that the Niles Tool Works Company have contracted with the American Pulley Company of Philadelphia for 60,000 American steel split pulleys annually for five years.

The movement to consolidate the large leather belting interests in this country, to which we have previously alluded, is in the hands of Percy A. Pickrell, 38 Wall street. Mr. Pickrell reports progress in the work and expects to have things in shape within another week. It is said that the following leather belt manufacturers are now seriously considering the proposition: Charles A. Schieren & Co., Schultz Belting Company, Page Belting Company, N. Palmer & Co., J. C. Paulus & Co., Providence Belting Company, Henry F. Whiting, George Rahmann & Co., J. E. Rhoads & Sons, Union Belt Company, Bay State Belting Company, Bickford & Francis Belting Company, J. H. Billington & Co., Bradford Belting Company, Jewell Belting Company, Leland Belt Company, Loeb Bros. Leather Belting Company, J. B. Williams & Sons, Moloney-Bennett Belting Company, Brooklyn Leather Belting Company, A. Burgess & Sons, Akron Belting Company, Alexander Bros., W. D. Allen & Co., C. W. Arnez & Son, E. E. Burnham & Co., H. N. Cook

Belting Company, Andrew Cowan & Co., Detroit Oak Belting Company, Fayerweather & Ladew, Josiah Gates & Sons, Holyoke Belting Company, Chas. L. Ireson, Manhattan Leather Belting Company, New York Leather Belt Company, Newark Leather Belting Company, National Leather Belting Company and Charles Munson Belting Company.

The Western Electric Company, Bethune street, New York, who are doubling the size of their plant, have ordered several machines from the Brown & Sharpe Mfg. Company.

The Cataract Optical Company, manufacturers of optical instruments, 367 373 Seventh street, Buffalo, N. Y., write us: "We expect soon to build a four-story brick factory, 150 feet long by 36 feet wide, of slow burning mill construction, basement 9 feet in the clear, and all floors 12 feet in the clear, supported on round iron columns, windows 3 feet 6 inches wide by 9 feet high, averaging 18 inches apart throughout the entire building. The building will be equipped with sprinkler system, fire wall between office and factory, freight elevator in tower supporting water tank, making with other numerous advantages a modern factory building. We shall put in additional machinery for working in steel and iron, building our own lathes for working in brass. The name of this company will be changed to Cataract Mfg. Company. We expect to use the Niagara Falls power for running our factory and lighting our building."

The Pneumatic Supply & Equipment Company have been organized under the laws of the State of New York, and have opened an office at 120 Liberty street, New York. It is the purpose of this company to deal generally in compressed air equipment, and they will make a specialty of the installation of complete plants, eliminating the division of responsibility which has heretofore existed in the trade. The company are bringing out several specialties in the compressed air line, such as pneumatic oil rivet forges, quick acting hose couplings, and have in addition closed agencies for several standard types of compressors. J. W. Duntley, the president of the Chicago Pneumatic Tool Company, is the president of the new company. E. B. Gallaher, formerly with Patterson, Gottfried & Hunter, is the vice-president and engineer, and W. P. Pressinger, formerly manager of the Clayton Air Compressor Works, is secretary and treasurer.

An addition is being built to the Union Station at Bay Ridge, L. I., of the Brooklyn Electric Illuminating Company. Seven 500 horse power Cahall horizontal water tube boilers have been ordered. These boilers will be equipped with automatic stoking machines. The entire order consists of 21 machines. At present 15 of the same machines are in use at this station. The equipment for the addition to the Bay Ridge plant is being purchased by Mr. Barstow. The company's offices are located on Pearl street, near Myrtle avenue, Brooklyn.

Westinghouse, Church, Kerr & Co., 36 Cortlandt street, have just sold to the United Railways & Electric Company of Baltimore an entire equipment of Roney stokers for the new power plant which that company are constructing.

In the fire which threatened the destruction of the United Station of the Brooklyn Heights Railroad Company, situated on the block bounded by Division and Kent avenues, Rush street and East River, Brooklyn, the only damage done to the equipment was the demolition of the coal conveying apparatus, which was installed by the C. W. Hunt Company.

Work has been commenced on the addition to the power station which is being built at Bloomfield and Fifteenth streets, Hoboken, N. J., by the North Hudson Light, Heat & Power Company of that city. The addition will cost about \$300,000. We understand that Allis Corliss engines and Babcock & Wilcox boilers have been ordered for this plant.

Bids will be received by the Department of Public Charities, foot of East Twenty-sixth street, until 12 o'clock noon May 15, 1899, for two boilers to be installed in the steamer "Thos. S. Brennan."

Chief Engineer Chase of the Water Department, Tonawanda, N. Y., will purchase a \$20,000 pumping engine. The Elmira Municipal Improvement Company contemplate the enlargement of the present water works system of Elmira, N. Y., and adding a \$50,000 pump.

The York Mfg. Company of York, N. Y., contemplate the erection of a large foundry.

The Harrison Safety Boiler Works of Philadelphia have shipped to the Brooklyn Navy Yard three separators for the engines of the cruisers "Isle de Luzon," "Don Juan de Austria" and "Isle de Cuba." These vessels are now undergoing repairs at the navy yard at Cavite, and the separators will be reshipped to that point.

Eastern Tubing Company, 107 Stuart street, Providence, R. I., have recently commenced making steel tubing for various purposes, and are making a specialty of brass plating on any kind of metal goods.

Birmingham.

BIRMINGHAM, ALA., May 8, 1899.

The demand for Iron the past week was considerably better, and there was an improvement in prices varying from 25c. to 50c. There were some orders for round lots as well as plenty of orders for medium and small sized lots. These latter were generally for prompt delivery, and commanded some premium over the deferred delivery lots. Gray Forge led the list in activity, and the sales of it during the week will approximate 30,000 tons. The week previous it was said that there were sales of it as low as \$10, although quoted materially higher. But the past week the price was moved up to \$10.50, at which sales were made, and the week closed with some sellers stating \$10.75 as the price. But the fact remains that a limited quantity could be had at \$10.50. No. 2 Foundry is quoted all the way from \$11.50 to \$12.25, with so far as could be learned only one seller at the inside price. There was one straight lot of 1000 tons, furnace delivery, that was held firm at close of week at \$12. The same lot could have been bought the previous week at \$11.25 to \$11.50. There were retail sales at \$12.25; but the bulk of the sales were at \$11.75. No. 3 Foundry is in demand at \$11.25, and No. 1 Foundry at \$12.50. The Soft grades are on a parity with Nos. 1 and 2 Foundry. The demand was a growing one all the week, commencing with only moderate transactions and increasing toward the close until it bordered on activity. All the furnaces were sellers, and the most of the business done was for the last half of the year. Inquiries for export were increased, and sellers asked for prices, as the foreign markets had advanced to a point where business could be placed. Some orders were accepted, but the new business was not large. There have been buyers of warrants on the market, picking up all that offered any profit. Stocks at furnace yards still show up practically bare yards. At one furnace the stock one day this week showed just 51 tons. It is stated with a good deal of positiveness that the Republic Iron & Steel Company will certainly erect one and probably two new furnaces, and that the Gate City Rolling Mill may be removed to Thomas. These projects are probably under consideration, as several well-known people in the Iron trade have been looking over the ground. Progress at the Steel plant has been rapid of late. The large engine in the blooming mill as well as the dynamo were tested the past week. The Riter-Conley Company of Pittsburgh, who had the contract for erecting the ten open hearth furnaces, have nearly completed it, and in a few days they will be turned over to the Steel plant. The machine shop and foundry is rapidly approaching completion. The Wire and Rod mill are getting in touch with the Steel plant, and preparations are now being made for the construction of the conveyors from the Steel plant to the Rod mills.

Five new industries have almost completed an understanding with the Commercial Club as to terms connected with their removal here. Attention has been directed to Mineral and Coal properties, and some have changed hands. The particulars are as yet withheld. There is one buyer in the field limiting his investments to the seams of the Pratt Coal in Jefferson County, and prices are realized that would not have been countenanced a year ago.

All our minor industries continue full of work. The five new foundry buildings erected for the Birmingham Machine & Foundry Company have been turned over to them, and they are possessed of the most complete shop in the South. Orders for Corliss engines continue to increase, while our boiler shops have all the work they can stand under. The many local improvements going on keep repair and Structural Iron shops at full employment. Several of them are working night and day shifts.

The Alabama Rolling Mill Company have taken up recently \$100,000 of outstanding bonds, and the Birmingham Rolling Mill will soon be sailing in smooth waters again.

The union molders in the various foundries of Massachusetts and Rhode Island have inaugurated a strike. They have been out for more than a week, and according to reports from that section seem to be delighted with their striking success. They have no doubt caused considerable annoyance to their employers, but we have not heard of any of the shops shutting down. The molders are holding out for \$3 per day, the abolition of piece work and recognition of the union card. The employers are in no instance disposed to concede these demands. The firms which are said to be affected are: The American Machine Company, the Vulcan Iron Company and the J. S. White Company of Pawtucket, and the following firms in Providence: New England Butt Company, Crompton & Knowles' Loom Works, Builders' Iron Foundry, Colvin Foundry, the Phoenix Iron Foundry, Miller Iron Works, Household Sewing Machine Company, Brown & Sharpe Mfg. Company, Alva Carpenter & Son and the Franklin Foundry & Machine Company.

The Carnegie Interests.

The Leaders.

Andrew Carnegie was born in Dunfermline, Scotland, November 25, 1835. His father was a weaver, in humble circumstances, whose ambition to raise his family suitably led to his coming to the United States in 1847. The family settled in Pittsburgh, and two years later Andrew began his career by attending a small stationary engine. This work was unsatisfactory and he became a telegraph messenger with the Atlantic & Ohio Telegraph Company, and subsequently an operator. He was one of the first to read telegraphic signals by sound. Later he was sent to the Pittsburgh office of the Pennsylvania Railroad as clerk to the superintendent and manager of the telegraph lines. While in this position he met Mr. Woodruff, the inventor of the sleeping car. Mr. Carnegie recognized the merit of the invention, and joined in the effort to have it adopted. The success of this venture gave him the nucleus of his wealth. He was promoted to the superintendency of the Pittsburgh Division of the Pennsylvania Railroad, and about this time was one of the syndicate who purchased the Storey Farm, on Oil Creek, which cost \$40,000, and yielded in one year over \$1,000,000 in cash dividends. Mr. Carnegie was consequently associated with others in establishing a rolling mill, and from this has grown the most extensive iron and steel establishment in the world. Besides directing this great iron industry, he long-owned many English newspapers, which he controlled in the interest of Radicalism. He has devoted large sums of money to benevolent and educational purposes, the sum total running up in the millions. Mr. Carnegie is a frequent contributor to periodicals on labor and industrial questions, and has published several books.

Henry Clay Frick, who has been the executive head of the Carnegie Steel Company, Limited, and the principal factor in its phenomenal development, and who will hold a large interest in the reorganized company, was born December 19, 1849. He is a son of John W. and Elizabeth Overholt Frick. His father was a farmer and of Swiss ancestry; his mother was of German ancestry, and the daughter of Abraham Overholt, one of the largest land owners and the leading miller and distiller of his time in Southwestern Pennsylvania. Like many who have attained conspicuous places in the commercial and professional world of America, Mr. Frick was reared in the wholesome environment of the country. His early education was the best the schools of the vicinity afforded, but with a precocious bent toward business affairs he gave up part of his school days to gratify the desire for practical training to the work of a clerk in a dry goods store in Mount Pleasant, Pa. In 1869 he sought a permanent business occupation, but taking that which was offered, entered the office of his grandfather as bookkeeper in Broad Ford, Fayette County, Pa.

Thus one of the principal factors in the industrial development of the United States, to whom the country owes much for its place as the foremost commercial nation of the world, modestly commenced his business life. While in the office of his grandfather, young Mr. Frick had his attention called to the value of the coke and coal deposits in the vicinity of Broad Ford. Coke making, then in its infancy as an industry, was a business with which he was not familiar, but he made a thorough investigation of its possibilities, and then entered into a partnership with a number of men in the locality, bought a tract of coal land and built about 50 ovens for the manufacture of coke. This was his first business venture, and he undertook its management with much enthusiasm. The business expanded rapidly, as a ready sale was found for the product at the foundries and furnaces operating all over the country. The capacity of the plant was enlarged as the demand for coke increased, and by 1873 the firm had 200 ovens. The panic of that year embarrassed many of the customers, curtailing the sale of coke considerably. Some of Mr. Frick's partners fell into financial straits, and the enterprise received a setback. In this emergency he appealed to friends who had faith in his ability, securing from them the means to enable him to purchase the interest of his partners, thus obtaining entire control of the business. Coal lands ranged low in price at that time and until the country recovered from the panic. Mr. Frick took advantage of the depression and acquired several good properties which had been put on the market. When business revived his good judgment in these purchases was demonstrated by the fact that for a time the annual profits more than equaled the purchase prices. In 1878 he sold an interest in the business to E. M. Ferguson of Pittsburgh. Subsequently, Walton Ferguson was admitted to the firm of H. C. Frick & Co. In 1882 the company were merged into the H. C. Frick Coke Company, Carnegie Brothers & Co., Limited, purchasing a large interest in the company.

The H. C. Frick Coke Company are now the largest coke producers in the world, owning in the Connellsville coke region in Fayette and Westmoreland Counties, Pennsylvania, nearly 40,000 acres of coal and 12,000 coke ovens, with a daily capacity of about 25,000 tons of coke, employing upward of 12,000 miners and coke operatives, and furnishing an enormous traffic for the railroads reaching the iron producing district.

The remarkable qualification as an organizer and director of extensive business interests displayed by Mr. Frick in the development of the coke industry brought him an offer in 1889 of a partnership interest and official connection with the Carnegie concerns. He was admitted to the firm of Carnegie Brothers & Co., Limited, as their chairman, and continued as chairman of that association and their successors, the Carnegie Steel Company, Limited, organized in 1892. In 1895, at the request of Mr. Frick, the duties of chairman were divided, most of the executive details being transferred to the office of the president, Mr. Frick retaining the title of chairman of the Board of Managers. In 1897 he also relinquished the management of the minor affairs of the H. C. Frick Coke Company, becoming chairman of its Board of Directors, enabling him to give more attention to his large and varied interests apart from the coke and steel business, and to gain some of the leisure which a life of incessant activity previously precluded. By reason of his position for many years as the head of several large employing interests, Mr. Frick has been necessarily brought into public prominence through the labor disturbances incident to the operation of such extensive industrial enterprise, notably during a strike at the Homestead Works of the Carnegie Steel Company, Limited, in 1892. Prior to this occurrence the company had enlarged their mills and installed improved machinery, designed to lighten the labor and at the same time increase the product, and as a result of these additions and improvements a number of employees in many departments, known as "tonnage men," who were paid certain fixed rates per ton of product, were enabled to earn wages in some cases 100 per cent. higher than was contemplated by themselves or the management when the wage scale was agreed upon three years previously—wages unreasonably high and entirely out of proportion to the wages paid other men in the same mill, and very much in excess of the wages for similar work paid by the competitors of the company.

In the negotiations between the officials of the company and the representatives of a labor organization for a new wage scale to take effect at the expiration of the then existing one, the labor organization officials refused to make or permit any reduction to be made in the rates paid to these tonnage men. Mr. Frick took a firm stand for the correction of this manifest injustice, and prepared a scale eliminating all the inequalities of the old one to meet the changed conditions, and presented it to the workmen without the approval of the labor officials. A strike involving all the men employed ensued, and was attended with extreme disorder and rioting. Time demonstrated the wisdom and justice of Mr. Frick's attitude in the matter. With less than a year's trial of the new scale the workmen and others intimately connected with the trouble freely admitted its fairness and liberality, and conceded the strike was a mistake and wholly unjustifiable. For many years Mr. Frick attempted to maintain contract relations with those he employed through labor organizations, but after exhausting every resource, including arbitration by disinterested persons mutually agreed upon, and failing to insure the operation of the works against interruptions on account of labor suspensions, he finally discontinued contracted arrangements with the employees through such organizations, contracting instead with the workmen direct. As a result of this policy suspensions have been infrequent, the causes of discord minimized and the condition of the workmen immeasurably improved.

In business Mr. Frick is wonderfully quick of comprehension and accurate in his judgment of men and affairs. It appears easy for him to select the best man for a particular duty. He never lacks courage to vigorously carry out his decisions. He is equally firm and courageous in opposing any measure of which his judgment or strong sense of right disapproves.

The Carnegie Steel Company, Limited, were organized July 1, 1892, for the purpose of consolidating under one management the business of the various iron and steel works in Pittsburgh which were owned and operated by Andrew Carnegie and his partners.

The History of the Company.

The previous history of the gradual but unceasing growth of the enterprise which led up to the present association, while of great interest to those of the pioneers who still aid it by their advice and counsel, or who take active part in the management of its business, is not material in any extended form to this brief statement

of what the Carnegie Steel Company, Limited, are now, and what they are doing.

On October 14, 1864, Andrew Carnegie organized the Cyclops Iron Company with a capital of \$100,000, the company including Aaron G. Shiffler, J. L. Piper, Thomas N. Miller, Thomas Pyeatte and John G. Mathews.

The Keystone Bridge Company were organized April 25, 1865, with a capital of \$300,000; the directors including Andrew Carnegie, Aaron G. Shiffler, John L. Piper, Walton Katté and James Stewart.

The Union Iron Mills were the next to be organized on May 1, 1865, by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., Andrew Kloman, Gustavus Praetsch, J. L. Piper, Aaron G. Shiffler and Thomas N. Miller. Capital, \$500,000.

Carnegie, Kloman & Co. followed December 1, 1870, the organization including Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., and Andrew Kloman.

December 27, 1871, the firm of Carnegie & Co. were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., George Lauder, Andrew Kloman and William Coleman.

In March, 1872, the Keystone Bridge Company, who were the second enterprise with which Mr. Carnegie was identified, were incorporated.

In January of the following year Carnegie, McCandless & Co. were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., Andrew Kloman, William Coleman, David A. Stewart, John Scott, William P. Shinn and David McCandless.

The subsequent history of the company may be briefly set out as follows:

1874, October 12.—The Edgar Thomson Steel Company, Limited, were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., William Coleman, David McCandless, David A. Stewart, John Scott, Andrew Kloman, William P. Shinn and Carnegie, McCandless & Co. Capital, \$1,000,000.

1877, August 12.—The Lucy Furnace Company were organized by Andrew Carnegie, Thomas M. Carnegie and Henry Phipps, Jr.

1879, October 21.—The Pittsburgh Bessemer Steel Company, Limited, were organized. Capital, \$250,000.

1881, January 7.—The Pittsburgh Bessemer Steel Company, Limited. Increased their capital to \$500,000.

1881, April 1.—Carnegie Brothers & Co., Limited, were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., David A. Stewart, John Scott, John W. Vandevort and Gardiner F. McCandless. Capital, \$5,000,000.

1881, June 1.—Lucy Furnace Company, Limited, were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., David A. Stewart, John Scott, John W. Vandevort, Gardiner F. McCandless, John T. Wilson, James R. Wilson and John Walker. Capital, \$1,000,000.

1882, January 21.—Wilson, Walker & Co., Limited, were organized by Andrew Carnegie, John Walker, John T. Wilson and James R. Wilson. Capital, \$500,000.

1883, January 31.—Hartman Steel Company, Limited, were organized by Andrew Carnegie, Henry Phipps, Jr., Henry W. Hartman, Isaac L. Ellwood, Aaron K. Stiles, John W. Calkins and Reuben E. Sears. Capital, \$300,000.

1895, May 1.—Hartman Steel Company, Limited, increased their capital to \$400,000.

1886, January 1.—Carnegie, Phipps & Co., Limited, were organized by Andrew Carnegie, Thomas M. Carnegie, Henry Phipps, Jr., David A. Stewart, John Walker, William H. Singer, George Lauder, Henry M. Curry, Samuel E. Moore, William L. Abbott, Henry W. Borntraeger, John W. Vandevort, Edward A. Macrum, Horace P. Smith, James H. Simpson, William W. Blackburn and Charles F. Forster. Capital, \$3,000,000.

1886, June 4.—Duquesne Steel Company were organized. Capital, \$325,000.

1888, March 7.—The Allegheny Bessemer Steel Company were organized. Capital, \$700,000.

1891, December 31.—Carnegie, Phipps & Co., Limited, increased their capital to \$5,000,000.

1892, July 1.—The Carnegie Steel Company, Limited, were organized by Andrew Carnegie, Henry Phipps, Jr., Henry C. Frick, George Lauder, William H. Singer, Henry M. Curry, Henry W. Borntraeger, John G. A. Leishman, William L. Abbott, Otis H. Childs, John W. Vandevort, Charles L. Strobel, Francis T. F. Lovejoy, Patrick R. Dillon, William W. Blackburn, William P. Palmer, Lawrence C. Phipps, Alexander R. Peacock, J. Ogden Hoffman, John C. Fleming, James H. Simpson and Henry P. Bope; with a paid up capital of \$25,000,000.

Their general offices are located in the Carnegie Building, Pittsburgh, Pa., with branch offices in 14 of the principal cities of the United States, as follows: Atlanta, Ga., Equitable Building; Boston, Mass., Telephone Building; Buffalo, N. Y., German Insurance Building; Chicago, Ill., Marquette Building; Cincinnati, Ohio, Neave Building; Cleveland, Ohio, Perry-Payne Building; Denver, Col.,

People's Bank Building; Detroit, Mich., Hammond Building; Minneapolis, Minn., Guaranty Loan Building; New York, N. Y., Empire Building; Philadelphia, Pa., Harrison Building; St. Louis, Mo., Chemical Building; San Francisco, Cal., 258 Market street; Washington, District of Columbia, National Safe Deposit Building; in Montreal, Canada, Bell Telephone Building; in Mexico City, Mexico, at 8 Calle de San Francisco, and in London, England, at 71-72 King William street.

The Properties Owned.

The properties to be included in the reorganization of the Carnegie Steel Company, Limited, are the following:

The Edgar Thomson Works, Bessemer, Pa., including the Edgar Thomson Blast Furnaces, the Edgar Thomson Foundry and the Edgar Thomson Steel Works.

The Duquesne Works, Duquesne, Pa., including the Duquesne Blast Furnaces and the Duquesne Steel Works.

The Homestead Steel Works, Munhall, Pa., including the Bessemer Steel Department, the Open Hearth Steel Department, the Finishing Mills and the Armor Plate Department.

The Carrie Blast Furnaces, Rankin, Pa.

The Lucy Blast Furnaces, Pittsburgh, Pa.

The Upper Union Mills, Pittsburgh, Pa.

The Lower Union Mills, Pittsburgh, Pa.

The Larimer Coke Works, Larimer, Pa.

The Youghiogheny Coke Works, Douglass, Pa.

All the capital stock of the Carnegie Natural Gas Company.

All the capital stock of the Youghiogheny Water Company.

All the capital stock of the Mount Pleasant Water Company.

All the capital stock of the Trotter Water Company.

All the capital stock of the Union Railroad Company.

All the capital stock of the Slackwater Railway Company.

All the capital stock of the Youghiogheny Northern Railway Company.

Over one-half of the capital stock of the Pittsburgh, Bessemer & L. E. R. R. Company.

All the coal and coke property of the H. C. Frick Coke Company in Fayette and Westmoreland counties, Pennsylvania, including 40,000 acres of unmined coal, 20,000 acres of surface rights, 11,000 coke ovens, 2500 railroad cars and 3500 dwellings.

All the capital stock of the Pittsburgh & Conneaut Dock Company; 43.6 per cent. of the capital stock of the Pennsylvania & Lake Erie Dock Company.

One fourth of the capital stock of the New York, Pennsylvania & Ohio Dock Company.

Five-sixths of the capital stock of the Oliver Iron Mining Company, owning all of the stock of the Metropolitan Iron & Land Company, all of the stock of the Pioneer Iron Company, 89.3 per cent. of the stock of the Lake Superior Iron Company and 98 per cent. of the stock of the Security Land & Exploration Company.

One-half of the capital stock of the Pewabic Company.

Three-fourths of the capital stock of the Pittsburgh Limestone Company, Limited.

The Plants.

Their principal works, a more extended description of which follows, are Edgar Thomson Furnaces, Bessemer; Duquesne Furnaces, Duquesne; Lucy Furnaces, Pittsburgh; Edgar Thomson Steel Works, Bessemer; Duquesne Steel Works, Duquesne; Homestead Steel Works, Munhall; Howard Axle Works, Howard; Keystone Bridge Works, Pittsburgh; Upper Union Mills, Pittsburgh; Lower Union Mills, Pittsburgh; Larimer Coke Works, Larimer and Youghiogheny Coke Works, Douglass; all in the State of Pennsylvania. Their more important products are armor plate, billets (1½ inches up), blooms, slabs, coke, ferromanganese, spiegeleisen, pig iron; forgings, such as axles, arch bars, links, pins and other car forgings, connecting rods, crank shafts, locomotive frames, eye bars; plates for boilers, bridges, ships and tanks, rails, steel 16 to 100 pounds per yard, steel splice bars (plain and angle) for all sections of rails; rolled structural shapes, such as angles, rounds, flats, squares, ovals, I-beams, channels, bulb angles, deck beams, tees, zeels, &c.; structural work, such as bridges, buildings, elevated railroads, girders, columns, &c. The works owned and operated by this association are as follows:

Edgar Thomson furnaces, at Bessemer, 2 miles from Pittsburgh, on the Pennsylvania, the Baltimore & Ohio, the Pittsburgh & Lake Erie, the Pittsburgh, Bessemer & Lake Erie and the Union railroads, and the Monongahela River. Nine stacks, four of which were built by the Edgar Thomson Company, Limited, and five by Carnegie Brothers & Co., Limited. Furnace A, 75 x 14 feet 6 inches, built in 1879; furnaces B, 80 x 18 feet, and C, 80 x 16 feet, built in 1880; furnaces D and E, each 80 x 21 feet, built in 1881; furnaces F and G, each 90 x 21 feet, built in 1886-87 and enlarged in 1892; furnaces H and I, each 90 x 21 feet, built in 1889-90. Fuel: Connellsville coke.

Ores: Lake Superior and foreign. Product: Bessemer and basic pig iron, spiegeleisen and ferromanganese.

Duquesne furnaces, at Duquesne, 4 miles from Pittsburgh, on the Pennsylvania and Union railroads, and the Monongahela River. Four stacks, two built in 1895-96 and two in 1896-97; each 100 x 22 feet. Fuel: Connellsville coke. Ores: Lake Superior. Product: Bessemer and basic pig iron.

Carrie furnaces, at Rankin, ½ mile from Pittsburgh, on the Baltimore & Ohio Railroad and the Pittsburgh & Lake Erie Railroad. Two stacks, known as Nos. 1 and 2. Product: Bessemer and basic pig iron.

Lucy furnaces, at Fifty-first street, Pittsburgh, on the Allegheny Valley Railroad. Built by the Lucy Furnace Company and enlarged by Carnegie, Phipps & Co., Limited. Two stacks, each 85 x 20 feet. No. 1 first put in blast in May, 1872, and No. 2 first put in blast September 27, 1877. Fuel: Connellsville coke. Ores: Pennsylvania and Lake Superior. Product: Bessemer, forge and foundry pig iron.

Annual capacity Edgar Thomson furnaces, 1,000,000 gross tons; Duquesne furnaces, 800,000 gross tons; Carrie furnaces, 200,000 gross tons; Lucy furnaces, 200,000 gross tons. Total, 2,200,000 gross tons pig iron.

Edgar Thomson Steel Works, at Bessemer, 2 miles from Pittsburgh, on the Pennsylvania, the Baltimore & Ohio, the Pittsburgh & Lake Erie, the Pittsburgh, Bessemer & Lake Erie and the Union railroads, and the Monongahela River. Built in 1874-75 by the Edgar Thomson Steel Company, Limited, and enlarged by Carnegie Brothers & Co., Limited, and the Carnegie Steel Company, Limited. First blow made August 25, 1875, and first steel rail rolled September 1, 1875. Four 15 gross ton converters, four spiegel cupolas, molten iron used, brought direct from the Edgar Thomson furnaces in ladles, 21 Siemens and two reverberatory heating furnaces, one three-high 40-inch blooming mill, two three-high rail trains (one 23-inch and one 25-inch), and hot saws and finishing machinery; iron and brass foundry forge containing one 6-ton hammer and two heating furnaces. Product: Bessemer steel rails and billets and iron and brass castings; annual capacity, 800,000 gross tons of ingots, 650,000 tons of rails and billets, and 50,000 tons of castings. Fuel: Natural gas.

Duquesne Steel Works, at Duquesne, 4 miles from Pittsburgh, on the Pennsylvania and the Union railroads and the Monongahela River. Built in 1886-88 by the Allegheny Bessemer Steel Company, and capacity increased in 1891-92 by Carnegie Brothers & Co., Limited. First blow made in February, 1889; two 10 gross ton Bessemer converters, 16 soaking pits and four trains of rolls (two 21-inch, one 26-inch and one 28-inch). Product: Rails, billets and splice bars; annual capacity, 450,000 gross tons of ingots. Fuel: Natural gas.

Homestead Steel Works, at Munhall, 1 mile from Pittsburgh, on the Pennsylvania, the Pittsburgh & Lake Erie and the Union railroads and the Monongahela River. Bessemer department built in 1890-91 by the Pittsburgh Bessemer Steel Company, Limited, and enlarged by Carnegie, Phipps & Co., Limited; first blow made March 19, 1881; first steel rail rolled August 9, 1881.

Open hearth department built by Carnegie, Phipps & Co., Limited, and the Carnegie Steel Company, Limited; seven furnaces completed in October, 1886, one in July, 1890, eight in September, 1890, and four in September, 1895. Two 10 gross ton Bessemer converters, 20 basic open hearth furnaces, one 28-inch blooming mill, one 23-inch and one 33-inch train for structural shapes, one 10-inch mill, one 32-inch slabbing mill, one 40-inch cogging mill, one 35-inch beam mill and one 119-inch plate mill; one 3000 and one 10,000-ton hydraulic press; press shop for forging, and machine shop for finishing armor plate, and steel foundry. Product: Blooms, billets, structural shapes, bridge steel, and boiler, armor, ship and tank plate and steel castings; annual capacity, 400,000 gross tons of Bessemer steel ingots and 1,000,000 gross tons of open hearth steel ingots; finishing capacity of armor plate department, 10,000 gross tons per annum. Fuel: Natural gas. Ten additional open hearth furnaces are being constructed, to be finished in June, 1899, with a capacity of 350,000 gross tons of ingots per annum. A 30-inch slabbing mill, a 128-inch plate mill, a 42-inch universal plate mill and a 48-inch universal plate mill are also being constructed, adding to the capacity of the works about 300,000 gross tons of plates per annum.

Howard Axle Works, at Howard, on the Pennsylvania Railroad and the Union Railroad; under construction and are to be finished this year, probably in November. Capacity, 100,000 tons per annum.

Upper Union Mills, at Thirty-third street, Pittsburgh, on the Allegheny Valley Railroad. Built in 1863-64 by the Cyclops Iron Company; enlarged by Carnegie, Klossman & Co., Carnegie Brothers & Co., Limited, and Carnegie, Phipps & Co., Limited; 19 heating furnaces and seven trains of rolls (one 8, one 12, one 18 and one 20 inch and two plate and one skelp). Product: Structural steel, steel bars and steel universal mill plates. Annual capac-

ity, 240,000 gross tons. Fuel: Natural gas and coal. Lower Union Mills, at Twenty-ninth street, Pittsburgh, on the Allegheny Valley Railroad. Built in 1861-62 by Kloman & Phipps, and enlarged by Wilson, Walker & Co., Limited, and by Carnegie, Phipps & Co., Limited; 28 heating furnaces, four trains of rolls (one 9, one 12, one 15 and one 78 inch), 18 forge fires and 14 hammers (700 to 7000 pounds). Product: Universal mill plates, car forgings, bridge work, angles, axles, links, pins and bar steel. Annual capacity, 130,000 gross tons. Fuel: Natural gas and coal.

Keystone Bridge Works, at Fifty-first street, Pittsburgh, on the Allegheny Valley Railroad. Built in 1864-65 by the Keystone Bridge Company. Product: Steel bridges, especially for railroads, elevated railway structures, and steel frames for modern office buildings; annual capacity, 50,000 gross tons.

Larimer Coke Works, at Larimer, Westmoreland County, Pa. Built in 1872-73 by Carnegie & Co. Annual capacity, 120,000 gross tons coke.

Youghiogheny Coke Works, at Douglass, Allegheny County, Pa. Built in 1891 by Carnegie, Brothers & Co., Limited. Annual capacity, 100,000 gross tons coke.

The land owned by the association and used in connection with its various works in Allegheny County aggregates 1007 acres, including 71.3 miles of river front on the Monongahela River between Pittsburgh city line and Duquesne.

Henry Clay Frick (chairman), C. M. Schwab (president), A. R. Peacock (first vice-president and general sales agent), Lawrence C. Phipps (second vice-president and treasurer), T. F. Lovejoy (secretary), Henry M. Curry, D. M. Clemson, Thomas Morrison and James Gayley constitute the Board of Managers, the present members and shareholders of the association being Andrew Carnegie, Henry Phipps, Henry C. Frick, George Lauder, William H. Singer, Henry M. Curry, Charles M. Schwab, Alexander R. Peacock, Lawrence C. Phipps, Francis T. F. Lovejoy, Thomas Morrison, George H. Wightman, Charles L. Taylor, James Gayley, Andrew M. Moreland, Daniel M. Clemson, William W. Blackburn, John C. Fleming, J. Ogden Hoffman, Millard Hunsiker, George E. McCague, James Scott, Henry P. Bope, W. E. Corey, Joseph E. Schwab, Lewis T. Brown, David G. Kerr, Homer J. Lindsay, E. F. Wood, H. E. Tener, Jr., George Megrew, Gibson D. Packer, Wm. B. Dickson, Albert C. Case, John McLeod, Charles W. Baker and W. R. Whitney.

The magnitude of the Carnegie Steel Company's operations may be understood from the statement that in 1898 the company made 17 per cent. of the pig iron produced in the United States, 36 per cent. of the product of Pennsylvania and 68 per cent. of the product of Allegheny County. They manufactured 22 per cent. of the Bessemer steel production of the United States and 42 per cent. of the like product of Pennsylvania. In March, 1899, they shipped from their various works 458,695 tons of iron and steel.

The Savings Fund.

For about ten years the Carnegie Company have maintained a savings fund for the benefit of their employees. This fund now amounts to over \$1,000,000 and is the accumulated savings of many employees of the company. The savings fund is the creation of Andrew Carnegie, who, in order to induce the workmen to save their earnings, obligated the Carnegie Steel Company, Limited, to pay the depositors a higher rate of interest on their savings than could be obtained from any bank, building association or other savings institution. The company have met this obligation at all times, regardless of adverse business conditions or fluctuation in interest rates, paying every one of their workmen who deposited his earnings with the company 6 per cent. per annum. Of course the company could not, even if lawful, undertake to do a general savings bank business and pay such a high rate of interest, consequently the benefits and deposit privileges which this savings institution affords are restricted to the employees of the company solely. The company also loan money to their employees to build homes, and the towns in the vicinity of Pittsburgh, where the great mills are located, are filled with pretty homes built by the thrifty workmen with the assistance of the company. The savings fund system is conducted on the same plan as public savings institutions, with the exception as stated. The company gratuitously provide for the administration of the bank and the depositors are relieved of all expense whatever. Deposit books are issued as they are to public savings bank patrons, and every mill department superintendent is authorized to receive and credit the deposits up to the amount of \$2000 for each employee.

The reorganized company will be the largest employer of labor in the world, and their pay roll will aggregate over \$20,000,000 per annum. They rejoice in having the best skill and most intelligent mill workers to be found anywhere.

Mr. Carnegie takes just pride in the prosperous condition of the workmen, and, touching upon this subject in his address to the employees of the Homestead Steel works November 5, 1898, at the dedication of the magnificent library and music hall which he presented to them, said: "Perhaps, when upon the subject of the works, I may tell you that I had a statement made of operations at Homestead last year, and found that the average earnings for the year of 311 working days, the average paid man and boy, common labor included, every man paid by the day, was \$2.91 per day, \$905 per year. Now, to know just what that means, the average at Pullman last year, I see, the highest ever made there, was \$538. There is one proud satisfaction our firm have in business, they challenge to produce a record like this, and it is something all my partners and myself think of, and which cheers us in all the cares pertaining to business, which are neither few nor light, that this remains their due, they can truly say, and, indeed, the devoted wives or sweethearts of my partners can sew it in illuminated texts, and," added Mr. Carnegie with a smile, "it might even be placed upon their tombstones." "Our firm paid the highest earnings ever paid to labor." President Schwab told me that the delegation which went from these works to greet the future President, Major McKinley, at Canton, carried a banner—"Homestead workmen, the highest paid men in the world." Well, the man who carried that banner told the truth more fully than is usually the case on political banners. The policy of the firm is that the men who work for the firm shall make higher earnings per year, upon the average, than those of other works, and also that the firm shall keep their works running as they have done, even during years of depression, which we have had for four years."

The company show much solicitude for the social welfare of their employees, and have provided ample educational and amusement facilities in the different mill towns for their benefit. Many years ago Mr. Carnegie founded and endowed a library and athletic club for the employees of the Edgar Thomson Works, which has cost him over \$500,000. In November last year a similar institution was thrown open to the workmen of Homestead. It includes under one roof an extensive library, music hall, with its pipe organ—a requisite of every institution founded by Mr. Carnegie—gymnasium, billiard rooms and a large swimming pool; also ground nearby for outdoor athletics. During the fall and winter seasons lectures and high class musical attractions are provided for the entertainment of the workmen at nominal cost. Mr. Carnegie has also authorized the building of a library, music hall and gymnasium for the workmen at the Duquesne plant. This building, like the one at Homestead, will be of beautiful design, and will cost about \$500,000.

Determination of Carbon in Iron and Steel Without Combustion Apparatus.

BY GEORGE T. DOUGHERTY, CHICAGO.

There has been a need of long standing for a reasonably quick and simple method of determining both kinds of carbon in iron and steel with accuracy of results equaling the standard method of combustion in oxygen or with sulphuric and chromic acids. Methods for estimating graphitic carbon, one among them by Eggertz, the father of the carbon color test, are given in text books; but all of them prescribe details or conditions which result in ruining their success for quick filtering or accurate work, and have been almost universally abandoned as giving too crude estimations. It is desirable to avoid gelatinizing the silicon as much as possible, for silica freshly separated retains more or less hydrated water when dried at 100-115 degrees C. Nitric acid diluted dissolves titanium carbide and other carbides, while dilute hydrochloric acid will not do quite as much, and usually leaves a dirty looking residue, which requires washing with caustic potassa, alcohol and ether. The following method for graphite I have designed to overcome all difficulties or objections, and, judging by my own experience as approved by checks with irons containing known quantities of graphite, leaves very little to be desired for simplicity of operations and reliability of results:

Method for Graphite.

Dissolve 1 gram of pig or cast iron drillings in 60 c. cm. of nitric acid, 1.135 sp. gr. (the same acid as is used for rapid phosphorus work); heat gently until all are dissolved, and boil a few minutes to cook the combined carbon entirely into solution. Do not evaporate unduly, or use stronger acid, or much less acid of the specified strength, for more silicon would gelatinize and increase the insoluble residue. Have weighed previously a Gooch crucible, with its lid and cap, and put a disk

of ashless filter paper (about the area of a dime or penny) in the crucible and weigh again. Fit the Gooch crucible with the paper disk in it in the filtering bottle in connection with the filter pump in action, and pour water in to cause the paper to adhere perfectly to the bottom of the crucible. Now filter the solution of the iron and wash five times with hot 10 per cent. nitric acid and once or twice with hot water. This operation of filtering and washing usually need not consume more than 10 or 15 minutes with good suction. Dry the crucible and contents to constant weight at 115-120 degrees C. on the hot plate under a large inverted broken beaker with an opening in the top for a thermometer, which should touch the hot plate. This apparently crude air bath dessicates 100 to 200 per cent. more quickly than the regulation copper air bath, probably because it allows of a constant current of air. The increase of weight (a) over the tare of the crucible and paper disk represents graphite and other insoluble residue. Burn off the graphite over a good Bunsen burner and weigh again when cool. The increase of weight over the tare of the crucible alone gives the amount (b) of siliceous residue. The difference between a and b indicates the quantity of graphite. The residue, which is silicon with sometimes a little iron oxide, usually amounts to from 0.0005 to 0.0040 gram, and the amount of hydrated water retained in the dried insoluble residue cannot on this small quantity of silica have amounted to anything to be allowed for in ascribing the entire loss on ignition to graphite. The graphite thus obtained burns off much more expeditiously than when it has been deposited on tared or counterpoised filters as used in the several old methods. Counterpoised or tared filters frequently give "shaky" results as in the determination of other elements. Paper disks (ashless), owing to their very small areas, are constant in weight, and are certain to filter more quickly than asbestos layers in Gooch crucibles at all times. Besides, the asbestos filter is found to retard the burning of graphite, since you cannot by means of a platinum wire very well press the latter against the red hot walls of the crucibles.

Two Methods for Combined Carbon.

1. The well-known color method, which need not be described in detail here, may generally be applied with considerable safety if you know the previous history of irons to be tested and have a standard iron of similar treatment whose carbon is not too widely different. White or mottled iron, for instance, cannot be reliably read off with a soft iron standard. Steel standards may be used, if they have been found by actual experiments to correspond well with various irons of known carbon contents. I have on hand such a steel standard (0.31 per cent. carbon), which is, of course, more convenient to use than a standard pig or cast iron, since steel drillings are uniform in carbon and do not require filtering when dissolved, while the whole lot of iron drillings must be mixed well on paper every time they are required, or segregation of graphite will ultimately occur with disastrous consequences. I do not, however, attempt to use that steel standard with irons of high combined carbon; in a case of recent occurrence it would show 2.64 per cent of combined carbon in a sample of white iron which had actually 2.49 per cent. The color method is, therefore, of limited value unless performed under certain conditions, and these conditions must be religiously adhered to. When the carbon in a sample of iron or steel is so low that its solution appears greenish instead of brownish when read in the camera behind the usual ground glass in daylight, or when artificial light is required, a thin slab of porcelain (such as they make lamp shades of) in the place of ground glass before an electric light will be found to remove entirely the green shade of low carbon tests and bring out different tints of brown color quite sharply and unmistakably.

2. The alternate method, which is more universal in application, and, like the one given above for graphite, aspires to equal the "old reliable" combustion process, is similar in some of the operations to the graphite method, and is as follows:

Pour on 1 or 2 grams of drillings in a dry beaker 60 or 100 c. cm. of a slightly warm 33 per cent. solution of double chlorides of copper and potassium acidulated with 5 per cent. of strong hydrochloric acid. Frequent or continual stirring greatly promotes the solution of the copper thus displaced. As for graphite, weigh the Gooch crucible alone, and again with a paper disk in. Turn on suction, pour water on, and then the copper and iron solution, wash twice with hot dilute hydrochloric acid (1 acid to 3 water), twice with hot water, four times with hot nitric acid of 1.135 sp. gr. (this to dissolve out copper sulphide and any particle of metallic copper), and finally twice with hot water. Dry to constant weight at not exceeding 120 degrees C. on the hot plate, taking more care regarding temperature than is neces-

sary for graphite. The increase of weight over that of the crucible and paper disk represents the quantity (a) of graphite, organic compound and insoluble siliceous residue, with often a little copper oxide. Burn off the graphite and organic compound and weigh again. The amount (b) of residue after ignition is shown by the increase of weight over the tare of the crucible alone. Deduct b from a and the remainder (c) is graphite plus organic compound. Again deduct from c the amount of graphite elsewhere determined; the remainder (d) is organic compound, which multiplied by 0.675 gives the amount of combined carbon. This method seems to be fully equal to the elaborate standard combustion process, and has the advantage of being simpler and quicker, with fewer possible sources of error. Some time ago I happened to find out that combined carbon set free by the double chloride of copper and potassium did not deposit in the form of pure carbon as commonly supposed, but of an organic compound of unknown composition; and I proceeded to standardize its actual percentage of carbon, which was done by treating by the method just described three steel standards of different carbons, which I had on hand, namely, 0.17, 0.31 and 0.48 per cent. The average of the results obtained, which by the way were pretty close, gave 67.50 per cent. of carbon, which I have adopted as the factor on the organic compound, which is certainly deserving of further study. If an asbestos filter be used instead of a paper disk, it would require a factor rather lower, but does not give equally satisfactory or uniform results.

It may prove interesting by way of illustration and comparison to subjoin the results of a recent analysis of standardized cast iron drillings marked A and furnished by the Standardizing Bureau of the American Foundrymen's Association, whose official figures for that sample are 3.11 per cent. graphite and 0.56 per cent. combined carbon, the average of combustion determinations by four different parties:

1 gram taken for graphite.			
	Grams.		Grams.
Crucible =	14.0258	Crucible + disk =	14.0682
	14.0255		
Residue after ignition =	0.0008	Total matter on drying =	0.0820
		Residue after ignition..	= 0.0008
		Loss by ignition.....	= 0.0812
		$0.0812 \times \frac{1}{0.675} =$	3.12 % graphite.
1 gram taken for combined carbon.			
	Grams.		Grams.
Crucible =	14.0258	Crucible + disk =	14.0820
	14.0252		
Residue after ignition =	0.0016	Total matter on drying =	0.0406
		Residue after ignition..	= 0.0016
		Loss by ignition.....	= 0.0389
		Graphite.....	= 0.0312
		Organic compound.....	= 0.0077
		$0.0077 \times 0.675 \times \frac{1}{0.675} =$	0.52 % combined carbon.
		By color with 0.31 % carbon steel standard	0.51 % combined carbon.
			0.52 % combined carbon.

Before concluding this article it will be important to point out that the last method given above is not applicable to ferromanganese without considerable modification in the details of the operation and in the factor used for calculation. Copper is an elementary constituent of the organic compound containing the carbon of ferromanganese separated by potassio-copper chloride; and it would be unsafe to use a platinum Gooch crucible with a paper disk for estimating it, since copper would be reduced from its combination and attack the bottom of the crucible, as it has done so in my experience. In such a case, unless one has an arrangement for passing oxygen gas into the crucible during the ignition, an asbestos layer may be used in lieu of a paper disk. Instead of 0.675 as for iron and steel, the factor would be 0.80 or more, depending largely on the mode of operation. I purpose to investigate and work out more fully this point later.

For a long time the Cambria Steel Company, Johnstown, Pa., have been at a considerable disadvantage over Pittsburgh concerns making iron and steel in the matter of freight rates. The charge on hauling ore from the docks to Johnstown has always been considerably in excess of the Pittsburgh rate. The concern have had this matter up with the railroads for a long time and have recently succeeded in securing concessions which will put them on an equitable basis with their Pittsburgh competitors. Partly on account of the concessions thus secured the Cambria Steel Company will before long commence work on two and perhaps three new blast furnaces, with a daily capacity of 500 to 600 tons each. The concern have been compelled to come into the market and buy Bessemer pig for their own use for a long time. With the building of these new furnaces they will be able to supply their own requirements. It is also probable that the Cambria Steel Company will include in extensive improvements they will make a large plate mill and will thus become larger factors in the plate trade than heretofore.

MANUFACTURING.

Iron and Steel.

The Penn Iron & Coal Company have decided to add another stove to their blast furnace at Canal Dover, Ohio, and the general manager, S. W. Croxton, has placed the contract for this stove with David Lamond, contractor and engineer, Ferguson Building, Pittsburgh, Pa. It will be of the C. H. Foote two-pass type of fire brick stove, 17 x 75 feet in size, and, together with the new blowing engine now being built, will give this concern a considerable increase in capacity.

We have already referred in these columns to the fact that the Coshocton Iron & Steel Company, Coshocton, Ohio, had been granted a charter of incorporation. It is now stated that the parties interested in this new company have no intention of commencing active business at present, as there are no prospects of raw materials to be obtained. Steps toward organization were taken some time ago, but recent developments in consolidations of steel industries make it appear unsafe for new companies in any branch of the iron business to make investments. It was the intention of the Coshocton Iron & Steel Company to make some specialties in polished and anti-rust sheet iron and steel. It is claimed that the location is admirably adapted for the purpose, being in the center of a previously possible supply of steel bars and cheap fuel, and the product of the mill would find a ready market within a radius of 200 miles.

The Champion Iron & Steel Company, Chicago, have taken out a license to incorporate, with a capital stock of \$400,000, to manufacture in iron, steel and other metals. Incorporators, Wm. S. Oppenheim, H. H. C. Miller and George H. Miller.

The Tidewater Steel Company have filed at Harrisburg, Pa., notice of an increase in the capital stock from \$1,000,000 to \$1,500,000.

The Trussville, Ala., Furnace property, with its lands, ore and coal deposits, coke ovens and town site, near Birmingham, Ala., have been placed under option to New York State parties represented by McElheny & Bennett, attorneys, 100 Broadway, New York. This property includes about 1700 acres of coal and about 2000 acres of Red Mountain ore.

The statement that the plant of the New Castle Tube Company, at New Castle, Pa., now owned by the Shelby Steel Tube Company, at Shelby, Ohio, had been sold to another concern is untrue.

Edward E. Erikson, consulting and mechanical engineer, Conestoga Building, Pittsburgh, has recently secured a number of large contracts. Among these may be mentioned one for three 20-ton acid open hearth furnaces for the new plant of the Pittsburgh Steel Foundry, at Glassport, near Pittsburgh. Also all the foundation work and the galvanizing mill for the new sheet mill plant of the Chester Rolling Mill at Chester, W. Va. Also a 10-ton air furnace for the Canton Roll & Machine Company, a new concern who are building a plant at Canton, Ohio. Mr. Erikson is just finishing up some large extensions to the machine shop of the A. Garrison Foundry Company, South Side, Pittsburgh, and is also just completing the building of some annealing and heating furnaces for the Dennison Rolling Mill, at Dennison, Ohio.

Jefferson Furnace, at Steubenville, Ohio, which has been operated under lease for some time by the National Steel Company, is now being operated by the Ohio Valley Iron Company, who secured possession of the furnace on May 1. It has a daily capacity of about 200 tons and is at present running on Bessemer pig. The output of the furnace will be sold by Naylor & Co. of Pittsburgh, Pa.

Zug & Co., Limited, of Pittsburgh, Pa., manufacturers of steel and iron sheets, are adding two hot mills to their equipment, which will give them a total of six mills. They have also just installed a heavy shear.

It is reported that Frank H. Buhl of Sharon, who recently sold the Buhl Steel Company to the National Steel Company, will purchase and put in operation the Wheatland Rolling Mill, at Wheatland, Pa.

The new open hearth building of the Lukens Iron & Steel Company, Incorporated, at Coatesville, Pa., is now being erected, and the foundations are going on for the furnaces and also for the universal mill building. The concern hope to have two of the open hearth furnaces in operation about September 1.

The Sharon Works of the National Steel Company, at Sharon, Pa., which is an open hearth plant, is to be considerably enlarged, and the capacity very materially increased. The National Steel Company are negotiating for a large plot of ground adjacent to the works on which the additions will be built.

The Reading Iron Company of Reading, Pa., are soon to resume operations at their rolling mill in the northern section of the city, after an idleness of several years. The company also contemplate erecting a forge on adjoining property which it is expected will take six months to build.

The W. Dewees Wood Company, McKeesport, Pa., sole manufacturers of Wood's smooth finished sheet iron and sheet steel and patent planished sheet iron, are making some extensions to their annealing building, and are erecting two new sheet mills and one cold rolling mill.

Last week Warner Arms, C. W. Bray and John Oliver of the American Tin Plate Company, in connection with A. G. Young, general traffic manager of that concern; G. B. Wheeler, division freight agent of the Lake Shore & Michigan Southern Railway at Cleveland; Frank A. Dean, general freight agent, and W. A. Terry, assistant general freight agent of the Pittsburgh & Lake Erie Railroad at Pittsburgh, made an inspection trip of the various tin plate plants of the American Tin Plate Company located in the Pittsburgh district. Visits were made to the different plants at Demmler, Monessen, Ellwood City and New Castle.

It is probable that the plant of the Keystone Rolling Mill, at Pittsburgh, owned by the estate of James McCutcheon, and which has been idle for some time, will be started up before long in the manufacture of skelp and light plates. It is also reported that part of the product will be cotton ties.

The Riddlesburg Furnace, belonging to the Kemble Iron Company, at Riddlesburg, 15 miles above Cumberland, Md., has been purchased by Carl M. Gage, general manager of the Huntingdon & Broad Top Railroad, for \$68,100, and a new company organized who are now operating the plant. The new company have applied for a charter under the title of the Colonial Iron Company.

The Roberts type of Cowper fire brick stove is being built at most of the large furnace plants; among the companies that have adopted this type of stove are the Ohio Steel Company, Youngstown, Ohio; Lorain Steel Company, Lorain, Ohio, and Laughlin & Co., Limited, Pittsburgh, Pa. This type of stove is patented by Frank C. Roberts of the firm of Frank C. Roberts & Co., engineers, Philadelphia.

The Chester Pipe & Tube Company of Chester, Pa., have received an order for 2½ miles of galvanized water pipe for use in the construction of a new water line to increase the water supply of Indiana, Pa.

The metal yard employees at the New Castle Works of the National Steel Company, New Castle, Pa., have been given an advance in wages, and are now being paid \$1.50 per day. It is a long time since common labor has been so well paid in the Shenango Valley.

The reorganization of the Rome Iron Company, Rome, Ga., is being advertised as required by statute in Georgia, and as soon as it can be legally done the reorganization will be formally effected. The blast furnace in Rome will be put in operation at an early date. L. S. Colyar will be president and general manager.

Some time ago the Monongahela furnaces of the National Tube Works Company, McKeesport, Pa., decided that when it became necessary to blow out either or both of their furnaces for relining they would enlarge them and possibly equip them with skip hoists instead of vertical hoists, but the concern do not contemplate adding any additional blowing capacity or remodeling the furnaces to any great extent. There is no probability of either of the furnaces being blown out during the present year, owing to the great activity in the iron trade.

We have already referred in these columns to the fact that a new tube plant is being built at Beaver Falls, Pa. The concern will be known as the Atlantic Tube Company, and the plant was expected to be ready for operation about May 1.

The plant of the Union Steel Company, at Alexandria, Ind., is to be sold at public sale May 15. It is intimated that the plant may be purchased by the Republic Iron & Steel Company.

Geo. E. Painter, Frank L. Clark and Veryl Preston, officials of the American Steel Hoop Company of Pittsburgh, were in the Mahoning Valley last week inspecting the plants of the Union Iron & Steel Company at Youngstown, Warren and Girard, recently taken over by the American Steel Hoop Company.

Machinery.

The Pierce-Crouch Engine Company of New Brighton, Pa., have served notice on the Champion Gas Engine Company of Beaver Falls, Pa., that certain important parts of the Champion engine are infringements on the Pierce-Crouch patents.

The annual meeting of the stockholders of the Pittsburgh Meter Company of East Pittsburgh, which was to have been held last week, has been postponed until next month.

The Kenney Company, founders and machinists, of Scottsdale, Pa., have established branch offices in Pittsburgh, with W. W. Rosensteel manager and general sales agent.

The Pneumatic Crane Company of Pittsburgh, to which concern we have before referred in these columns, have leased a part of the plant formerly occupied by the Westinghouse Machine Company, at Twenty-sixth street and Liberty avenue, Pittsburgh, and expect to be ready for operation about June 1. This concern propose to manufacture a new design of crane, to be operated by compressed air.

Another indication that prosperity is returning and business rapidly increasing in the wood working machinery line, as well as all others, has been demonstrated by the J. A. Fay & Egan Company, who are the largest manufacturers of all kinds of machinery for working wood in the world, and whose works are located at Cincinnati, Ohio. They are building a large addition to their plant, and are now equipping it with the latest improved tools; they have just raised the wages of their employees

10 per cent., and have done this without solicitation from their men.

The W. R. Colecord Machinery Company, St. Louis, have removed from 502 North Second street to larger and more convenient quarters at 423 and 425 North Second street, corner Vine street. Their trade has steadily increased, and having now greater floor space their stock of machine tools will be added to.

The Heflinger Steel Die Company, St. Louis, Mo., makers of hand and power dies for the paper and leather trades, exhibit unusual activity in their leather die department. The orders now on hand are a result of the immense business being done by the shoe manufacturers of St. Louis, whose operations are becoming more extensive each month.

The Cincinnati Machine Tool Company, Cincinnati, Ohio, have just completed their first lot of the Kirkhoff pattern drill presses, consisting of 26, 30 and 40 inch sizes; also a lot of 24 and 25 inch sizes. They now have under way very nearly a hundred made from entirely new patterns and designs, embodying many new and practical features, which are expected to be ready for delivery in about two weeks. The company have thoroughly overhauled their plant, installing nothing but the latest and most labor saving tools and appliances.

As an evidence of the popularity of the Reeves variable speed countershaft, brought out by the Reeves Pulley Company of Columbus, Ind., they have recently installed three in the new shops of the G. A. Gray Company of Cincinnati, a dozen or more in the Cincinnati Milling Machine Company's plant, and 88 in the new shop of the Lodge & Shipley Machine Tool Company, Cincinnati.

The Indianapolis Drop Forging Company, located at the intersection of Downey street and the J. M. I. R. R., Indianapolis, Ind., are exceedingly busy at present and say that if business continues they will have to seek larger quarters. They manufacture forgings of all kinds.

The Duthie Machine Company of Indianapolis, Ind., have installed new machinery and in connection with their chain business will build special machinery and also manufacture specialties. They are exceedingly busy at present; in fact, have been so since the first of the year.

The Muncie Foundry & Machine Company of Muncie, Ind., have completely overhauled their plant, putting in modern tools. They are building an addition of 50 x 125 feet, and will build special machinery of every description. They will also do a general foundry and machine business. The company have recently been reorganized and have several large orders booked for early delivery. They also will manufacture gears of all kinds.

The H. K. Porter Company of Pittsburgh have been granted a charter with a nominal capital of \$8000. The directors are H. K. Porter, W. E. Lincoln, W. E. Martin, all of Pittsburgh; E. P. Lord of Sewickley, and C. L. McHenry of Allegheny, Pa. This new concern take over the business of H. K. Porter & Co., builders of light locomotives, whose plant is in Pittsburgh.

The Chase Pump & Mfg. Company, Columbus, Ohio, have now in course of erection an addition to their present plant which when completed will give them approximately one-third greater capacity for producing their specialty, pumps and pump supplies.

Dresses, Mueller & Co., Cincinnati, Ohio, one of Cincinnati's largest machine tool concerns, have advanced the wages of their employees in all departments from 8 to 13 per cent., and are about to erect another addition to their already large plant.

Dean Bros. Steam Pump Works, Indianapolis, Ind., have just installed an additional multiple drilling machine, a radial tapping machine and an automatic turning lathe, and state that trade conditions with them are most excellent. Their foreign demand is on the increase. One of the more important shipments made recently is a pair of pumping engines for the water works at Sydney, Australia. The operating force of the company has been increased and they are now running 13 hours daily.

Greenfield Machine Company have recently been organized at Greenfield, Mass., to manufacture universal grinders. The officers of the company are: President, H. E. Goodell, formerly of Goodell, Son & Co.; secretary and treasurer, R. F. Smith, who had been superintendent of the No. 2 factory of Wells Bros. & Co. Wells Bros. & Co., Greenfield, Mass., have been appointed sole selling agents for this concern.

The Foadick & Holloway Machine Tool Company of Cincinnati, Ohio, are putting up a new plant in Cumminsville which they expect to occupy in September. The plant is to be of the best of materials and to be first-class in every respect, and the power plant will be of the highest type. The main building will be 80 x 239 feet and the side building 17½ x 125 feet. There being streets on three sides of the plant, excellent facilities are afforded for shipping and handling raw material and product.

The Chas. Scott Spring Company, Philadelphia, makers of machinery springs, are building new shops on the site of their shops recently burned. They have acquired some adjoining properties, and the new plant will, besides covering a larger area, contain an equipment which will extend the capacity for production at least 25 per cent. The new buildings will be of steel and brick construction and embody the latest ideas in vogue to render them fire proof. The buildings will be erected over the

company's present temporary shops without interference with their business.

Wm. Tod & Co., engineers, founders and machinists, of Youngstown, Ohio, have an order from the Sharon Works of the National Steel Company, Sharon, Pa., for a compound blowing engine of the steeple type; steam cylinders to be 42 and 80 inches diameter, Corliss valve movements, air cylinders 84 inches diameter, stroke 60 inches; work upon which is now well under way.

In these columns reference was recently made to a mechanical induced draft plant built for the Compania Metalurgica Mexicana. The two fans included in this plant, and which were recently shipped to the above company at San Luis Potosi, Mexico, were as large as ever have been built for this work, and without question the largest, if not the first, ever used in Mexico. The power plant of S. D. Warren & Co., the well-known manufacturers of coated or enameled paper, of Cumberland Mills, Maine, included fans of the same size, which were also built by the Buffalo Forge Company, Buffalo, N. Y. The installation included economizers, and the whole plant was put in by Westinghouse, Church, Kerr & Co., New York City. The last order of importance for a similar plant received by the Buffalo Forge Company calls for two fans of very nearly the same size, but having direct attached double upright double acting inclosed engines of the United States Navy type. This outfit is to be shipped to Johannesburg, South Africa. Mechanical induced draft is being introduced into all sections of the world, and its adaptability for all grades of coal of different countries is being demonstrated with each succeeding installation.

The American Pulley Company of Philadelphia have purchased ground at Nicetown for the erection of a new factory, having outgrown their present quarters. As soon as they are installed they will provide machinery for increasing the size of their all wrought steel pulleys from 24 inches diameter, the present size, to 42 inches diameter by 24 inches face. After this has been accomplished the plans call for a still further increase in capacity for diameters up to 6 and 7 feet. The company have closed a contract with the Niles Tool Works for 60,000 pulleys a year for five years.

The Chicago Pneumatic Tool Company have purchased the patents formerly owned by the Consolidated Pneumatic Tool Company, now defunct. These patents include all the Keller & Wolstencroft types of tool construction, and in addition several new applications which have not yet been taken out. These patents originally cost the Consolidated Pneumatic Tool Company about \$40,000, and in purchasing them the Chicago Pneumatic Tool Company acquire control of about all of the pneumatic tool patents of value in existence.

Bridges.

Arguments were begun in the United States Circuit Court before Judge Allen of Springfield in the demurrer which has been filed by the city of Streator, Ill., against the charges made by the Lafayette Bridge Company in a suit of assumpsit. The company ask \$40,000 damages against the defendant for failure to pay for the construction of a steel bridge over the Vermillion River at Streator, Ill. The defendant in its demurrer revives the charges of bribery of aldermen by the plaintiffs, and the defendant also attacks the plaintiffs on the ground that they conspired with other bridge companies, forming a trust to prevent competition in the bids for constructing the bridge.

A chartered bridge will be erected over the Monongahela River between Allenport and Fayette City, Pa.

It is very probable that a drawbridge will be built across Stockton Channel, at Stockton, Cal., by the Southern Pacific Railroad.

Negotiations are being made, it is said, for the sale of the Philadelphia Bridge Works in Pottstown.

A bill has been introduced appropriating \$16,000 for the rebuilding of the existing bridge over the Erie Canal at Lockport, N. Y.

Park Commissioner Wahl of Milwaukee, Wis., has designed a unique bridge to span the junction of two ravines in Lake Park and connect the driveways. The structure would cost about \$10,000.

Mr. Hacker of the Detroit, Mich., Council has secured the adoption of a resolution requesting the Legislature to pass the act to enable the city to issue bonds in the sum of \$600,000 to construct a new Belle Isle Bridge.

Two new iron structures are to replace wooden bridges on the Northern Central Railway this season. One is to span the highway leading to Big Stream Point and have a 40-foot span resting on two stone piers. The other will cross the chasm at Rock Stream. The estimated cost is \$45,000.

The following directors have been re-elected by the stockholders of the Troy & West Troy Bridge Company: John D. Spicer, John F. Roy, T. A. Knickerbocker, William H. Doughty, Edward M. Green, S. B. Saxton, Lawrence Roy and George B. Pattison.

The annual meeting of the Centre Bridge Company was held at Centre Bridge, Pa., and the following officers were elected: President, I. S. Creamer; managers—Thos. H. Buckman, Jesse Fell, John Lilley, O. H. Sproul, Wm. W. Wilson, Howard Johnson; treasurer, Cyrus Risler.

The Southern Railway has placed orders for over \$300,000 worth of new iron and steel bridges.

Hardware.

Reed & Prince Mfg. Company, Worcester, Mass., manufacturers of rivets, wood screws, machine screws, stove and tire bolts, stove rods, tacks, &c., announce that they are again in position to handle orders with promptness, and couple the announcement with thanks to their customers and friends, both for their kind expressions of sympathy in their recent loss by fire, and patience because of enforced delay in executing orders. In making the necessary repairs the company have also arranged for a material enlargement of their facilities in all departments.

The Don Wire Works Company, Louisville, Ky., advise us that a large number of their Kirker-Bender fire escapes were erected during the past year. Among prominent concerns from whom orders have recently been received are the American Tobacco Company, who are equipping their several factories with them. The company issue an attractive card illustrating the device in a graphic manner, and also a catalogue giving a detailed description of it.

The King Powder Company, Cincinnati, Ohio, advise us that their semi-smokeless powder, which is intended especially for fine rifle shooting, has met with the marked approval of expert riflemen of this country and abroad who have tested it. It has accordingly been adopted by many rifle fraternities. The company state that it has also been discovered that the powder gives as good results in shotguns as do some of the so-called smokeless powders, and that it differs from the best of them only in that it gives a little, light, vapory smoke. Costing but a few cents more than common black powder, it is specially recommended for sporting purposes.

The Humphries Mfg. Company, Mansfield, Ohio, advise us that the demand for pumps so far this year has been largely in excess of the same period during 1898, and present indications are that their plant will be kept running full up the balance of the year on orders. Their foreign trade, they report, is steadily increasing as well as the domestic. A special shipment of their goods was recently made to Porto Rico.

W. B. Neff, manufacturer of washing machines, with factory at Cowan, Ind., expects shortly to place a new lawn swing on the market. The demand for washing machines is referred to as better this season than ever before.

The Surprise Washing Machine Company of Muncie, Ind., state that they are away behind on shipments of their Surprise washing machine, and will build an addition to their present quarters this fall if the trade continues. W. H. Ballard, the general manager, regards the outlook for business in general as very bright.

The Farmers' Fence Company of Indianapolis, Ind., recently organized to manufacture fence stays, report business very good and the outlook among the farmers promising. W. E. Stevenson, formerly in the hardware business at Greencastle, is the president, and G. M. Brown secretary and general manager.

The Indestructible Fence Post Company, Brazil, Ind., advise us that the demand for their specialty is excellent, their trade so far this year being double that for the entire year of 1898. Among the larger orders received lately was one for 2000 fence posts from the Cleveland, Cincinnati, Indianapolis, Chicago & St. Louis Railroad. The company have been compelled to increase their working force, operating 60 hours per week, and will materially enlarge their capacity in the near future.

The statement that James McKay & Co., chain manufacturers, of Pittsburgh, have purchased a site at McKee's Rocks, that city, for a new chain plant is untrue. There were some negotiations regarding a site, but owing to the fact that a consolidation of the principal chain manufacturers may be formed and that most of the plants are under option to July 1, all negotiations for a site for a new and larger plant to be built by James McKay & Co. have been declared off.

The Novelty Stamping Company, Bellaire, Ohio, advise us that they will not join in the recent consolidation of stamping interests.

Miscellaneous.

The employees of the Lehigh Zinc & Iron Company, at Bethlehem, Pa., have received an advance in wages of 10 per cent., dating from May 1.

The Pittsburgh Brake Shoe Company of Pittsburgh have been granted a charter of incorporation with a capital stock of \$100,000.

The American Specialty Stamping Company of Johnstown, Pa., have been granted a charter of incorporation with a capital of \$75,000.

The Warner Elevator Mfg. Company, Cincinnati, Ohio, recently received an order from Mexico for two of their largest elevator outfits for installation in the "Centro Mercantil," a large retail store in the City of Mexico. Another order was recently filled for the residence of President Diaz, in the Palace Chapultepec.

Hendey Machine Company of Torrington, Conn., are building a new engine room 40 feet wide and 60 feet long. The side walls are of brick; the roof has steel trusses with corrugated iron covering supported on steel purlins. A large ventilator ex-

tends along the ridge of the roof. The corrugated iron is lined with the Berlin Iron Bridge Company's patent anti-condensation lining. The Berlin Iron Bridge Company furnish and erect the steel frame work and covering.

The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Wednesday, May 3, the president, P. D. Wanner, occupying the chair.

After routine business was disposed of Edgar S. Cook, president of the Warwick Iron Company, Pottstown, Pa., read the following paper on "Blast Furnace Compared with Cupola Practice—Casting Machines for Foundry Irons," which we print elsewhere.

During the reading of the paper Mr. Cook exhibited a number of specimens from a large collection on view at the meeting.

Discussion.

Asa Whitney: I should like to confirm Mr. Cook's remarks regarding higher carbon in sandless pigs. In car wheel work I have found that the carbon in the interior of the wheel is lower than that in the tread. I have noticed this for several years. There is a difference in, say, 6 inches back from the chilled tread. Another instance is in the case of shots of car wheel iron made by sprinkling in water. They prove to be higher in total carbon than the drillings from the gray iron of the chill test.

F. A. Riehle: Would it add to the cost of the pig iron to make it in the way described?

Mr. Cook: No, I do not think it would. The appliances necessarily would be expensive. Where the tonnage is large I think there would be some economy, but where it is small I doubt whether there would be any saving. We should, however, get rid of the excessive labor during the hot summer months. This year the warm weather is starting in early, and in hot weather there is always trouble. That is why I am interested in the casting tables. There is a table in operation at a Lebaron furnace, and the Cambria people have a table 160 feet long which will take 2000 tons of iron per day.

The Chairman: While the condition of the iron may change during these processes its composition remains the same. If that is the case it impresses me very favorably as against the old process of casting in sand molds. I have often thought that the method of casting in sand, with the sand hanging on to the iron as it does, and bad sand frequently used, too, was a nuisance.

C. R. Baird: We are operating in Virginia with an output of about 5000 tons per month, all of which is going into foundry work. We can cast either in chills or sand, and we are casting all in chills without a complaint from any quarter that I know of, and we have shipped many thousands of tons. We get a report on the silicon and sulphur in the iron, and think in this way much more accurate results are obtained than is the case when grading by fracture. Mr. Eldridge, who is present, has seen all the foundrymen using the iron, and could probably tell you of personal experiences with it.

Mr. Eldridge: The most marked case I know of is this: Some of the iron cast in chills came up from Virginia, and we made a shipment of about 100 tons to a foundry, and it was remarked that it was pure white. It was rather a small chill, but purely white. The question came up as to whether it could be used in a line of castings to be machined, which would mean that the metal should be reasonably soft. We believed that the composition of the metal was all right for the purpose. The machine work, by the way, was rather large, the sections pretty heavy. After some careful melting tests the iron was put through the cupola and resulted in a very fine casting, which was machined well afterward. There is one thing I want to mention, and that is the theory on the part of certain people that in composing a mixture where you take two irons, one a 2 X, and the other a gray forge, the irons will go through the cupola with substantially the same hardness as they enter. I wish Mr. Cook would say something about that.

Mr. Cook: Some facts in regard to castings have come to my attention that are hard to account for by chemical analysis, as ordinarily made. To what extent oxidized or burned iron may explain the apparent contradictions is yet to be determined. Of two castings, molded from the same pattern, and made from the same pig, one was brittle and very weak, light colored in fracture, drilled hard, with little or no grain, except in middle. The other was a rich dark color in fracture, drilled easy, soft and tough.

The analyses were as follows:

	Bad casting.	Good casting.
Silicon.....	1.85	2.05
Phosphorus.....	0.542	0.621
Sulphur.....	0.092	0.080
Graphitic carbon.....	2.89	2.84
Combined carbon.....	0.37	0.34

Foundrymen can explain the cause of difference in these castings better than I can.

In answer to your questions I would say, however, as a rule, irons of the same composition will come out of the cupola the same and give the same results, if the conditions were the same throughout. Of this I have no doubt.

I will give you an illustration of the effect of sulphur. There is a local foundry near our furnace, which has given me the opportunity of studying some features bearing on foundry practice, especially in regard to the changes iron undergoes in the cupola. The foundry I allude to is conducted on a small scale. The proprietor is cupola tender, molder, and everything else. He comes or sends to our furnace for a ton of iron and a load of coke. On one occasion he got a ton of iron from pig bed, taking it direct from the truck. We had the analysis of this iron, showing 3 per cent. silicon and 0.01 per cent. sulphur. In one heat he used one-half of this load. He made some hollow ware castings, with bottom $\frac{1}{4}$ inch thick and sides 1-16 inch thick. The castings were entirely satisfactory, just what he wanted, gray and soft. The remaining half of cart load of iron, melted a few days afterward, gave results just the reverse. The casting molded from same pattern was white. He brought pieces of the gray and white castings to me, saying he could not understand why one should be gray and the other white. "If," he said, "I had not loaded the iron myself from the same truck, and saw it placed on the truck from the same bed in casthouse, hauled it myself to the foundry, and charged the cupola myself with coke from the same pile, I would have blamed the iron, but I know better than that." The gray casting he had melted down very hot, and it contained about 0.04 or 0.05 per cent. sulphur, while the white casting contained about 0.15 per cent. sulphur. As compared with the pig iron the sulphur of the casting had been multiplied 15 times in going through the cupola. It was simply a question of the iron absorbing sulphur from the fuel that caused the casting to be white, due to lower temperature, the silicon and sulphur of the pig in both instances being the same.

There is more or less misapprehension in regard to the moisture in the atmosphere. The grains of vapor of water or moisture per cubic foot of air is by no means the greatest on a rainy day. A clear but hot day will frequently show much higher moisture than another day when rain is falling. The capacity of the atmosphere to carry moisture depends upon the temperature.

Trade Publications.

Box Nailing Machinery.—A catalogue by William S. Dolg of 54 Franklin street, Brooklyn, describes and illustrates nailing machines of varying sizes and styles which have been designed and constructed for the requirements of different trades. The machines are provided with automatic adjustable feeders which deliver the nails safely into the proper channels, without missing a single head, and so place them that they may be driven home by the machine. The greatest skill and ingenuity have been employed in designing them, and the most particular attention is paid to the smallest detail of their construction. The nails are thrown into the pan, automatically run into and through the channels, and one by one fed at the cut-off. No nails are missed; never are two fed to the machine instead of one. In short, the nails are delivered as they should be delivered—without error or failure. The feeder has an absolute cut-off.

Cranes.—Under this title the Brown Hoisting & Conveying Machine Company of Cleveland, Ohio, describe and handsomely illustrate the several types of cranes built by them. In the introduction it is stated that with the "Weston Patent" safety lowering device, which the company own and use exclusively, it is impossible to drop a suspended load, whether through use, misuse, carelessness or neglect, or in the case of their hand operated cranes to injure a workman by flying handles in lowering a load. The company are the sole patentees and builders of the cantilever and Gantry cranes, intended particularly for wide spans such as are called for in ship yards. Several of these cranes built by the company are illustrated by handsome half-tones. These cranes embody entirely new features in crane construction, which allow the long spans and high speeds for which they are designed and equipped. Their Gantry cranes are so constructed that if the tracks upon which they run get out of parallel or out of level, as frequently happens, or if by reason of slippery rails or other causes one end of the crane is behind or ahead of the other, the crane can yet operate steadily within reasonable limits until the trouble can be rectified. Heretofore it has been impossible to build Gantry cranes with spans over 90 or 100 feet because owing to their rigid construction they would soon tear themselves to pieces for the reasons above mentioned. In their Gantry crane

there is no attempt to connect the bridge to the legs rigidly, the bridge being pivotally connected to the pier at one end and suspended from a ball and socket joint at the other. In both types the girders or bridge trusses are of their patented construction, invented and designed to give the maximum strength with the minimum weight of material, and all the members made of such shapes and so arranged in the trusses as to expose the least possible surface to wind pressure. This question of wind pressure is of the greatest importance in the exposed locations where these cranes are usually used. One pair of engines or an electric motor, with three drums, operated through special friction clutches and controlled by a single operator, drives all three functions of the crane, no dead weight (motors or machinery) being carried on either bridge or trolley, as in other power cranes. This allows the lightest form of bridge construction and very quick movement of trolley, and especially allows the trolley to be started, run at full speed or stopped suddenly, which cannot be done with the ordinary type of trolley having a dead weight of several tons of motors and machinery. The cantilever cranes have an automatic counter weight running on a track along the bridge and above the hoisting trolley and connected by ropes to the latter, so that whatever the position of the hoisting trolley on one arm of the crane the counter weight at all times automatically occupies a similar position on the other arm. The company have Gantry cranes in operation of 237 feet span, both legs being operated by one source of power with a bridge speed along surface tracks of 200 to 900 feet per minute. The company are building a special form of electric tramrail and trolley in which the trolley travels along an overhead runway at the rate of 250 feet per minute, and can go from any point in the room to any other point, notwithstanding the room may be full of posts, by means of a transfer table connected with each runway. When the crane is on the transfer table the table is controlled by the operator and is moved longitudinally by the crane motor also. Such a system of runway can be built extending from one building to another and covering all the principal buildings around any large manufacturing plant, with transfer tables, switches, &c. These cranes are built in capacities from 1 to 10 tons.

Foundry Equipment.—The S. Obermayer Company of Cincinnati, Ohio, have issued a very complete catalogue dealing with the latest improvements and labor saving devices connected with the modern and up to date foundry. They also describe everything needed in a brass, iron or steel foundry. The first part considers the Whiting cupola and brick for lining their cupolas. This lining proper consists of special brick made of proper curvature to fit the cupola. They are extra large in size, averaging about 9 x 9 x 4 $\frac{1}{2}$ inches, and may be backed up with common shaped fire brick, which the company also supply. They then describe blowers, ladles of many forms, trucks, turn tables and so on. The brass founder's portion of the catalogue mentions furnaces, tumblers, flasks, metal cutting band saws, core ovens, sifters, &c. The Avery molding machine is exceedingly simple in design and consequently not liable to get out of repair. The operation is conducted by two men, who are able to put up 700 to 1300 molds on one machine for a day's work.

Pressure and Speed Governors.—Dean Brothers Steam Pump Works of Indianapolis, Ind., have issued a catalogue describing their new pressure and speed governor for steam pumps, which is used not only for automatically regulating the pressure of pumps but also for regulating the speed. It is simple, compact and easily adjusted to the required conditions. It may be used with either horizontal or vertical steam pipes. In addition it may be used with either kind of direct connecting pumps, single or duplex, and is adapted to govern hydraulic pumps working under heavy pressure.

Pumping Machinery.—A pamphlet by the John H. McGowan Company of Cincinnati has been received. This does not embrace the complete line of pumping machinery manufactured by them, but only those designs for which there is a current demand. Descriptions are presented of duplex boiler feed pumps, pressure and light surface pumps, automatic feed pumps, and receivers, pumping engines, single cylinder pumps and so on. These pumps are all substantially built after improved designs and are extremely well finished.

On April 1 labor known as common labor in the Mahoning Valley, Ohio, received an advance of about 10 per cent. On May 1 all day labor (except common labor) that is controlled by the Amalgamated scale was advanced 10 per cent., so even the returns of sales and shipments of bar iron for the months of March and April show that Amalgamated labor is entitled to an advance. It will mean that all labor about the mills will receive an advance in wages.

HARDWARE.

Condition of Trade.

JOBBERs generally report a very satisfactory business, last month having been an excellent one and May opening up well with a brisk demand for goods and strong tone in the market. The outlook for the remainder of the year is decidedly hopeful. Prices have not been materially changed since our last report, but the tendency of the market is still upward, especially as the high prices of raw material are affecting lines which have been slow to advance. Thus from week to week many kinds of minor shelf and general Hardware are being advanced slightly. The matter of consolidations continues to command much attention, and in addition to the great movements of this character there are a good many relating to special lines in which promoters are endeavoring to bring the manufacturers together, obtaining options, &c. Some of these will undoubtedly materialize, but in many of them the manufacturers prefer to hold aloof and continue to run their own business. In others the experience of the past will thus be repeated and the temptation to sell out at a fancy valuation overcome the reluctance of manufacturers to lose their identity. This sort of thing will probably continue as long as a confiding and sanguine public are willing to absorb the securities thus thrown on the market, many of them with perhaps the prospect of early gain, but with a large question as to their ultimate and permanent value. Meanwhile the Iron and Metal market continues very strong, and many manufacturers are having a good deal of trouble in getting their raw material. The volume of business from manufacturers to jobbers is not especially large at present, the lull which we have before referred to being likely to continue until jobbers' stocks are pretty well disposed of, when if conditions remain as at present the prospect for the maintenance of existing prices and the resulting policy in regard to purchases will be carefully canvassed. At this time jobbers are pursuing a middle course in regard to the cutting of prices. Few goods that have been radically advanced can be bought as low from manufacturers as from the jobbers, but at the same time jobbers' prices are as a rule materially higher than they have been. The stocks in retail hands are larger than for some time, and in some sections goods are moving more freely under improved conditions, resulting from the better condition of things among the retailer's customers. The higher prices which are current are apparently accepted by the trade without question, but there are some indications that the heavy advances are diminishing somewhat the demand from consumers. The confident tone which prevails throughout the country, however, has its effect on all classes and tends to stimulate enterprise and justify the existing hopefulness. There continues to be a large movement of goods abroad, which is made possible in spite of the higher prices here by the fact that similar,

if not in all cases as radical, advances have taken place among the Continental producers. The export business is thus still an important part of the trade, and one which many manufacturers are cultivating more assiduously and intelligently than ever. The country is thus making rapid progress in the establishment of its commercial supremacy.

The letters which follow from gentlemen prominently identified with the marketing of goods reflect the conditions coming under their observation in the various sections of the country to which they relate.

Chicago.

(By Telegraph.)

Shelf Hardware jobbers report the volume of business keeping well up to the fine record established by the previous months of the year. The character of business is changing with the advance of the season and other goods are called for, but the same trouble exists in getting a sufficient supply from manufacturers. Factories are behind in shipments, particularly on all kinds of Wire Goods, Steel Goods and Agricultural Tools. Manufacturers of Sheet Zinc have changed their discount, the advance made being equal to 16½ cents per 100 pounds. The movement in building material during the past month has been very good, but it appears to have been on account of orders placed months before for spring shipment. The demand for this class of merchandise is now lighter, and a lull is expected until stocks are used up. The outlook for building, however, is extremely encouraging. The building permits issued in the city of Chicago during April involve an expenditure of practically \$3,000,000, which is over double that of the corresponding month last year, and has only been exceeded three times in the last decade. It is presumed that other localities are enjoying as great an increase in the building trade, and if this is the case the outlook for a very great variety of merchandise is extremely favorable. The demand for Heavy Hardware has been very good, with stocks of Bar Iron considerably broken, on account of the stoppage of mills making arrangements to enter the consolidation known as the Republic Iron & Steel Company. All kinds of Wagon and Carriage Hardware and Trimmings have been in as heavy demand as at any previous period. A meeting of Wagon manufacturers will be held here on the 24th inst. It is stated that an effort will be made to consolidate the leading concerns in this line.

St. Louis.

(By Telegraph.)

The fact that no news of great interest may be reported to-day may be taken as an indication of regular and seasonable business. The retail trade is known to be well occupied with work, and conversation about Garden Implements, Hose, Cultivators and Seed is heard on every side. Paints are moving more freely, and their application is readily seen in the better appearance of both the business and residence districts. The scarcity of Screen Wire and made up goods is causing considerable anxiety to jobbers and dealers, and relief is hoped for soon. The retailers are buying quite freely of Tinned and Stamped Ware of all kinds, and Copper Goods are not far behind in the demand. Builders' Hardware is being put into quick use and specifications are being daily

presented. Money is being spent in improvements of all kinds, and small enterprises are being developed to a surprising degree.

From William P. Bissell.

I have recently visited jobbing towns on the Mississippi and Missouri rivers; also several interior points. All the wholesale Hardware houses are doing good business at good prices and profits. There are a few pessimists who all along have had no confidence in higher prices, and consequently have not been benefited to any extent by recent advances, so they do not feel very enthusiastic over existing conditions.

Most every dealer has followed advances promptly and held firmly to existing prices. The season has been exceedingly backward all through this section, and it has brought farm work in a bunch and been detrimental to retail trade. While at the present time advances are not as sharp or as frequent as they were 60 days ago, prices are firm and the tendency still upward. Prospects for business in the future are exceedingly good, with no indications of any reaction or reductions. Combinations continue to be formed, and all seem to flourish, and the public seem bound to have them. If they did not they certainly would not continue to buy the stock, but as long as most every new enterprise is subscribed for two or three times over before it is fairly launched or stock issued, it is likely that promoters will continue to meet the demands of the people.

From Geo. H. Bartlett.

I imagine many commercial travelers have asked themselves lately the same question that I have: "What am I traveling for?" Certainly not for the purpose of hunting up additional business for those manufacturers who are already snowed under with orders, notwithstanding the warm weather. Perhaps some of us are going the rounds for the purpose of explaining to our customers just why it is that their shipments are so delayed, but we could do all that by mail, and it is less trying to write explanatory letters than to meet our customers face to face and have them ask in tones neither childlike nor bland, "Why don't you people ship us those goods we gave you an order for in January?" To which you reply in a little stereotyped speech that you have spoken until you hate it.

One thing is certain, and that is that we would much rather have the jobbers kick because of delays in making shipments than to go through such experiences again as we did in 1896 for example. How very tired it used to make us when we were continually asked wherever we called upon a buyer: "How much lower are you going to sell us this time?" Or sometimes it would be, "We will consider your proposition and if you will leave us your address we will, perhaps, mail you an order," to which a sorely tried commercial traveler once replied: "Oh, don't do it. I am chock full of that kind of orders!"

Now everybody is busy, and consequently happy, save a small minority who imagine there must be disaster ahead because we are moving so fast. But these few timid ones should bear in mind that it is not the limited express train that most often comes to grief, but rather the "slow coach" that doesn't move fast enough to keep out of its own way.

From Charles H. Wier.

The spring trade is now virtually over and business has resumed its normal seasonable condition.

Jobbers are taking advantage of the lull in trade by taking stock and formulating their plans for next season's trade.

The prospects of a good fall trade are excellent, but we must not overlook the fact that the stocks of Hardware, &c., are larger than usual at this season, owing to the fact of large purchases having been made in anticipation of advances, and in many cases contracts have been made extending late into the season. This will affect the usual seasonable purchases to a considerable extent. The higher values of Hardware will have a beneficial effect on the

entire trade, as the selling prices are too frequently based on a percentage, and the advanced values of merchandise will be a more satisfactory basis for profit.

Notes on Prices.

Wire Nails.—The condition of the Wire Nail market shows no especially new features. The demand upon manufacturers and jobbers continues in good volume, and the latter are in many cases sending in sorting up orders. Quotations remain unchanged as follows, terms f.o.b. Pittsburgh:

To jobbers in carload lots.....	\$2.10
To " " in less than carload lots.....	2.12½
To retailers in carload lots.....	2.20
To " " in less than carload lots.....	2.30

The mills are generally naming delivered prices, which include freight added to Pittsburgh price. Jobbers are in many cases slightly underselling the above quotations.

New York.—Local demand keeps up well, with signs of increased consumption as the season advances. The market is firm at the following quotations:

To retailers, carloads on dock.....	\$2.30 to \$2.35
To " " less than carloads on dock.....	2.45 to 2.50
Small lots from store.....	2.55 to 2.60

Chicago, by Telegraph.—Manufacturers find the demand less urgent, but the volume of business is still quite large. They report that a careful investigation of the condition of stocks among large buyers shows a remarkably heavy percentage of the trade practically without stocks and therefore compelled to continue to buy. It is known that few of the large buyers were able to correctly calculate the amount of the year and invariably found themselves compelled to purchase more than they had expected. The season of more quiet trade is now at hand, but for this reason it is expected that the condition of business will be far from dull. Single carload lots continue to be quoted at equivalent of \$2.35, Chicago. Jobbers report their business only moderately active, which is the usual experience at this time. Small lots from stock are held at \$2.45.

St. Louis, by Telegraph.—Prices remain unchanged and the volume of orders good. Carload lots to jobbers are quoted at \$2.30, St. Louis. Small lots from store are held at \$2.50.

Pittsburgh.—The Wire Nail market is very active, the mills of the American Steel & Wire Company being operated to their utmost capacity to meet the heavy demand, which is increasing right along and which promises to be the largest ever known in the history of the trade. The amount of building going on throughout the country is very large, thus creating a heavy demand for Nails, upon which the high prices have apparently had no effect. Some large buyers of Nails report that shipments are being made more promptly than for some time. There has been no change in prices since our last report and we quote: Wire Nails to jobbers, \$2.10 in carload lots; to jobbers in less than carload lots, to apply on contracts, \$2.12½; to retailers in carload lots, \$2.20; to retailers in small lots, \$2.30, all f.o.b. Pittsburgh.

Cut Nails.—There has been no change in the Cut Nail market during the past week. The Eastern Cut Nail market is firm, based upon the following prices, f.o.b. Pittsburgh, freight being added to destination:

To jobbers in carload lots.....	\$1.75
To " " in less than carload lots.....	1.80
To retailers in carload lots.....	1.80
To " " in less than carload lots.....	1.95

New York.—The improved demand in the New York market referred to last week continues. Quotations are unchanged as follows: Carload lots on dock New York, \$1.90 to \$1.95; small lots from store, \$2.05 to \$2.10.

Chicago, by Telegraph.—A fair amount of business is being done by jobbers at \$1.90 for small lots.

St. Louis, by Telegraph.—The usual amount of business is being transacted and at same price as prevailed last week.

Pittsburgh.—The several Cut Nail mills in the Ohio Valley and the one concern in the Mahoning Valley mak-

ing Cut Nails are running to full capacity and meeting with a good demand for their product. These mills, we understand, are not parties to the agreement existing among the Eastern Cut Nail manufacturers. We quote Cut Nails at \$1.65 in carload lots and \$1.75 in less than carload lots, f.o.b. maker's mill, Wheeling. These prices are practically equal to the prices fixed by the Eastern Cut Nail makers, which are based f.o.b. Pittsburgh.

Barb Wire.—Business in Barb Wire continues in large volume at the established prices of the American Steel & Wire Company. Quotations are as follows, f.o.b. Pittsburgh:

To jobbers in carload lots, Painted.....	\$2.20
" " " Galvanized.....	2.70
" in less than carload lots, Painted.....	2.23½
" " " Galvanized.....	2.72½
To retailers in carload lots, Painted.....	2.30
" " " Galvanized.....	2.80
" in less than carload lots, Painted.....	2.40
" " " Galvanized.....	2.90

Chicago, by Telegraph.—Manufacturers find trade a little lighter than it has been, nevertheless orders being received are enough to keep them busy and well satisfied with the condition of trade. They quote single carload lots at the equivalent of \$2.20, Chicago, for Plain Annealed Wire, \$2.45 for Painted Barb Wire and \$2.95 for Galvanized Barb Wire. Jobbers report a moderately good business, as usual at this season, and quote small lots from stock at 10 cents per 100 pounds above carload prices.

St. Louis, by Telegraph.—An unusually good feeling is shown in Barb Wire, and while prices are unchanged purchases are being handsomely made. The price to jobbers in carload lots of Painted is \$2.40; small lots from store are quoted at \$2.60. Galvanized commands 50 cents more.

Pittsburgh.—Prices established by the American Steel & Wire Company are being steadily maintained, but here and there slight concessions are reported by some jobbers who covered some time since when the market was lower. The volume of business in Barb Wire is heavy, and is increasing right along. We quote at \$2.20 for Painted in carload lots to jobbers, and \$2.30 to the small trade, with an advance of 50 cents for Galvanized, all f.o.b. Pittsburgh.

Smooth Wire.—The advance in the price of Smooth Wire announced three weeks ago is firmly maintained. The volume of trade is liberal at the following quotations, f.o.b. Pittsburgh:

To jobbers in carload lots.....	\$1.95
To " " in less than carload lots.....	1.97½
To retailers in carload lots.....	2.05
To " " in less than carload lots.....	2.15

The charge for galvanizing is now 50 cents on sizes from 6 to 14 inclusive; on Nos. 15 and 16 it is 85 cents, and on Nos. 17 and 18 \$1.10.

Pittsburgh.—There is a heavy volume of business and prices fixed by the American Steel & Wire Company are being maintained. Retailers are experiencing some difficulty in getting shipments of Smooth Wire as fast as needed. We quote: Jobbers, \$1.95; to smaller trade, carload lots, \$2.05, and less than carload lots, \$2.15. On Galvanized Plain Wire all sizes up to and including No. 14, 50 cents advance; 15 and 16, 85 cents; 17 and 18, \$1.10, all f.o.b. Pittsburgh, with freight tariff to destination added.

Oilers.—Another advance, which is the second since March 1, has been made by the manufacturers of Oilers. This is on account of the advances in the prices of raw material. Business also in these goods has been active, one of the manufacturers representing it at 50 per cent. more this year thus far than any corresponding period within five years. The price of Zinc has advanced to such an extent that Aluminum is coming into use.

Chain.—The market for Coil and Miscellaneous Chains continues exceedingly firm. Not only the cost of the raw material but the difficulty of obtaining it tends to make the market not only steady, but strong in price. It is understood that efforts are being made to consolidate Chain interests, and that options have been secured on most of the plants. It remains to be seen whether or not the efforts in this direction will be successful.

Axles.—The advance in Axles which has been for some time under contemplation was made last week. Present quotations are as follows, subject to a discount of 3 per cent. for cash:

	Iron.	Steel.
Concord, Loose Collar.....	5¼	5
" Solid ".....	5¾	5¼
No. 1 Common.....	4	3¾
No. 1½ " New Style.....	4½	4½
No. 2 " Solid Collar.....	4¾	4¾
Discount.		
Nos. 7, 8, 11 to 14, Half Patent.....	60 and 5 per cent.	
Nos. 15 to 18.....	50 per cent.	
Nos. 19 to 22.....	70 per cent.	

Wire Cloth.—Wire products continue very strong in price, and manufacturers have difficulty in obtaining Wire sufficient for their requirements. A marked scarcity in Screen Wire Cloth has been developed, and houses who have a stock of goods are disposed to hold it very firmly. Jobbers in New England and the East generally are disposed to ask \$1.50, but lower prices are obtainable as yet in the West.

Bicycles.—It is understood that the negotiations which have been going on among the leading manufacturers of Bicycles are progressing favorably, and it is thought not unlikely that the efforts looking to a consolidation of interests will be successful. It is not anticipated, however, that this will have any effect on the prices of Bicycles the current season.

Hatchets.—Some of the leading manufacturers of Hatchets have been conferring with a view to reaching a better understanding in regard to prices, and perhaps giving up the manufacture of some of the lower grades.

Tacks.—The market for Tacks is slightly higher than it has been, manufacturers revising their quotations and bringing them up to the level required by the increased cost of the raw material. The demand continues good, and the market has a firm tone. There is, however, a good deal of difference in the quotations of different manufacturers on the same goods. The matter of weights is deserving the attention of the trade, "Standard" Weights being quoted from 10 to 20 per cent. less than "Straight" or full weight goods.

Rivets.—The market for Rivets is referred to as firm, with an excellent demand. In view of the increased cost of the raw material it is thought by some not unlikely that higher prices will be announced before long.

Copper Wire.—The manufacturers of Copper Wire are conferring with a view to coming to some agreement in regard to prices instead of having the market an entirely open one as at present.

Cordage.—Rope remains at former manufacturers' quotations of 9¼ cents for Manila, 7-16 inch and larger, and 8¾ cents for Sisal of corresponding size. The larger part of their business now is filling contract orders, as present prices offer little inducement except for pressing requirements. There is a possibility of lower prices for Rope should Hemp values decline further. The following are manufacturers' quotations:

	Per pound, cents.
Manila, 7-16 inch and larger.....	9¾
" ¾ inch.....	10¼
" ¾ and 5-16 inch.....	10½
Sisal, 7-16 inch and larger.....	8¾
" ¾ inch.....	9¼
" ¾ and 5-16 inch.....	9¾
" Lath Yarn.....	8¾

Manila Tarred Rope, 15-thread, is quoted 9¼ cents, as is also Manila Hay Rope, medium. The price of Jute Rope is 5¼ cents.

Binder Twine.—Conditions in the Binder Twine market have not changed since our last report. Manufacturers are still busy filling contract orders; new business is not large in volume. Crop conditions have improved somewhat within the past two weeks. The following are manufacturers' unchanged quotations for carloads, f.o.b. Eastern factories, with an advance of ¼ cent per pound for less quantities:

	Cents.
White Sisal, 500 feet to pound.....	9¾
Standard, 500 feet to pound.....	9¾
Manila, 600 feet to pound.....	10¾
Pure Manila, 650 feet to pound.....	10¾

Glass.—It is reported that the arrangements are about completed for the formation of the American Glass Company. This is the new combine which is to supplant the American Window Glass Association, the present association of Glass manufacturers. It is stated that the capital of the new company will be in the neighborhood of \$30,000,000 and that they will control over 90 per cent. of the country's Window Glass capacity. Careful estimates by those familiar with the present and prospective independent capacity place the figures at nearer 75 than 90 per cent. The present situation is favorable for the American Association, as it is expected that they will have a large and well assorted stock at the end of the fire June 1, while but few of the independent factories are expected to have an accumulation of Glass on hand at that time. Jobbers' stocks are reported to be in such a condition that they will soon require replenishing. Under the foregoing conditions the outlook is more favorable for an advance than a decline in prices. The American Window Glass Association's prices to the regular trade are unchanged as follows:

Districts.	A.	B.	C.	E.
5000 boxes or more.....	85 & 10	85 & 10	.....	85 & 10
Carloads.....	85	85	85 & 2½	85
3000 boxes or more.....	85 & 5	85 & 5	.....	85 & 5 & 2½
1000 boxes or more.....	.....	.....	85 & 10	.....

These prices are subject to freight allowance.

Paints and Colors.—**White Lead**—An advance in the price of Pig Lead has been accompanied by an increase in orders for White Lead in Oil. The advancing season may also have aided in stimulating new business. Paints and Oils are proverbial as being among the last lines to recover after a season of depression, and a complete revival in this line of business is not expected by some until fall. Prices of White Lead continue unchanged, as follows: In lots of less than 500 pounds, 6¼ cents; 500 pounds or over, 5½ to 5¾ cents.

Oils.—**Linseed Oil.**—The Linseed Oil market is unsettled, owing to a further decline in the price of seed. This is attributed to the manipulation of the seed market in the West, in which the attempt was apparently made to force the price of seed down and to keep the price of Oil up. The offering of lower than regular prices has not attracted large buyers, who, as a rule, had covered their requirements early in the year upon more favorable terms. It is anticipated by some in the Oil trade that Oil will recover, perhaps be higher in price. Trade is quiet, and in absence of brisk business City crushers are quoting former prices, as follows: City Raw, 49 to 50 cents per gallon; Boiled, 51 to 52 cents per gallon. Western Oil has been quoted at from 3 to 6 cents below these prices.

Spirits Turpentine.—The arrivals of Turpentine at this point continue light, with a moderate demand from purchasers. The market is represented by quotations of 43½ cents for Southern and 44 cents for machine made barrels from stock, while early arrivals are offered at about 1 cent less.

Hardware Organizations.

Hardware Association of the City of New York.

THE Hardware Association of the City of New York was formally organized Wednesday, May 3, at a meeting of the leading jobbing houses of New York, held in the rooms of the Hardware Club.

HOUSES REPRESENTED.

Representatives of the following concerns were present, viz.: Russell & Erwin Mfg. Company, Sargent & Co., Sickels & Nutting Company, Underhill, Clinch & Co., Smith, Lyon & Field, White, Van Glahn & Co., C. A. Baynon & Co. and Robert J. Masbach.

MEMBERSHIP OF FOUR CLASSES.

Provision has been made for different classes of members, active, associate, auxiliary and allied, as follows: Hardware jobbers having offices in the city of New York

will constitute the active membership and have a vote; Hardware manufacturers having offices in this city will be associate members; commission merchants having offices in New York will be auxiliary members, and wholesale merchants dealing in allied goods, as, for instance, Sporting and Athletic Goods, Wooden Ware, Enameled and Tinware, House Furnishing Goods, &c., will be allied members, the three latter classes having no vote.

ADMISSION AND DUES.

The admission fee was fixed at \$10, with annual dues of \$10.

OFFICERS.

The following officers were elected: Alfred D. Clinch, president; E. C. Van Glahn, treasurer, and Benjamin A. Hawley of Russell & Erwin Mfg. Company, secretary. The officers mentioned, together with Thomas J. Atkins of Sargent & Co. and Robert Sickels, constitute an Executive Committee.

FIRM MEMBERSHIP.

The membership of this organization consists of firms, not individuals, and should a member of the Executive Committee be absent the concern could designate another representative.

AIM OF THE ORGANIZATION.

The object of the association is to promote good feeling, prevent senseless price cutting, maintain a reasonable profit on sales and investigate alleged abuses of all kinds before accepting as facts what often does not exist except in the inventive imagination of some buyer. A. D. Clinch, who was unanimously chosen president, has taken the initiative in this movement, and the organization has resulted from his efforts. It is expected that it will accomplish much in cultivating a spirit of fraternity and promoting the interests of the trade.

Texas Hardware Jobbers' Association.

The fourth annual convention of the Texas Hardware Jobbers' Association was held at Sherman on the 25th and 26th ult. It is referred to as the most successful convention ever held by the association, and the members are very much gratified with the work which has been accomplished and the prospect for future usefulness. The sessions of the convention were held in the parlors of the Merchants and Planters' Bank, and the citizens of Sherman regaled the delegates with a carriage drive about the city and a sumptuous banquet.

A number of felicitous speeches were made at the banquet, notably those of J. J. Mandelbaum, president of the Southern Hardware Jobbers' Association; F. A. Heitmann, president of the Texas Association; James Moroney of the Moroney Hardware Company, Dallas, and W. L. Sanford of the Roberts, Sanford & Taylor Company, Sherman.

The association was also entertained by Mrs. Kidd-Key, president of the North Texas Female College, at an elegant concert and reception.

ELECTION OF OFFICERS.

The following officers were elected for the ensuing year:

President, F. A. Heitmann, F. W. Heitmann & Co., Houston.

First vice-president, J. C. Bering, Bering-Cortes Hardware Company, Houston.

Second vice-president, Walter Tips, Austin.

Secretary-treasurer, Robert Elkel, F. W. Heitmann & Co., Houston.

Executive Committee.

Jas. Moroney, Moroney Hardware Company, Dallas.
R. F. Bell, R. E. Bell Hardware Company, Weatherford.

A. P. Duncan, McLendon, Duncan & Co., Waco.
W. L. Sanford, Roberts, Sanford & Taylor Company, Sherman.

The president appointed the following standing committees:

Transportation.

Geo. A. Trumbull, Huey & Philp Hardware Company, Dallas.

E. A. Peden, Peden & Co., Houston.

W. L. Sanford, Roberts, Sanford & Taylor Company.

Manufacturers.

A. C. Goeth, Walter Tips, Austin.

Jos. F. Meyer, Jos. F. Meyer & Co., Houston.

Jos. Eikel, Eikel-Breustedt Company, Waco.

Grievance.

H. Elmendorf, Elmendorf & Co., San Antonio.

C. E. Nash, Nash Hardware Company, Fort Worth.

H. L. Bettes, H. S. Bettes Hardware Company, Paris.

Southern Indiana Retail Hardware Dealers' Association.

As a result of the continued competition between the retail Hardware dealers and the jobbers and manufacturers (both direct and through the department stores), which has brought about a gradual decrease in the volume of their business, the retail merchants of Southern Indiana held a meeting at Princeton on the 18th ult. and organized what is known as the Southern Indiana Retail Hardware Dealers' Association. The purpose of this organization is to harmonize the difference between the retailers and the jobbers and manufacturers regarding such competition, to inculcate a more friendly co-operation among the dealers themselves and to benefit to the fullest extent their business interests.

The following retail Hardware dealers, who became charter members, attended the meeting:

MERCHANTS PRESENT.

Robert Ingle, Princeton.

W. H. Stewart, Oakland City.

H. C. Simmons, Evansville.

E. M. Bush Hardware Company, Evansville.

John L. Griffith, Fort Branch.

F. M. Scantland, Princeton.

M. J. Carnahan Company, Washington.

Redman & Daugherty, Owensville.

Wm. Sterns & Co., Owensville.

Wm. Kinderman, Boonville.

Lucas & Funk, Princeton.

Dufandauf Hardware Company, Huntingburg.

Epperson, Herriot & Co., Princeton.

W. H. Weed, Vincennes.

W. W. Robb, New Harmony.

French & Boyd, Poseyville.

Wm. T. Creck, Oakland City.

P. Emery & Sons, Vincennes.

Hatfield & Palmer Company, Washington.

W. H. Weed of Vincennes was chosen president of the association and W. W. Robb secretary and treasurer.

The following circular has been issued cordially inviting merchants to unite with the association:

A CIRCULAR.

Whereas, The retail Hardware dealers throughout our section have been and are now suffering greatly from the sale of merchandise in their line by manufacturers, jobbers and catalogue houses direct to the consumers and such dealers as are not regularly established in the retail Hardware business, and believing themselves in need of protection against such trade, a number of the retail Hardware dealers of Southern Indiana met at Princeton, Ind., on April 18, 1899, and effected an organization by which they might (in a measure at least) protect themselves against such inroads.

This organization is known as the Southern Indiana Retail Hardware Dealers' Association, whose object it is to inculcate friendly co-operation, instill confidence and protect the retail Hardware dealers from direct competition with the manufacturers and jobbers.

We therefore extend to you and all retail Hardware dealers in Indiana, also bordering towns of Illinois and Kentucky, a cordial invitation to unite with us and aid us in perfecting an organization that will surely be a decided benefit to our branch of business.

In order that you may immediately do so we inclose you blank application, which please fill out and mail (together with \$3, which includes membership fee and dues for one year) to the secretary and treasurer, who will mail you a certificate of membership and a copy of the resolutions and by-laws.

Since the meeting a number of additions have been made to the membership and the association is regarded as commencing its operations under favorable auspices.

Correspondence.

The Revival of "Good Faith."

There have often been complaints on the part of manufacturers that merchants have attempted to cancel orders placed at a stipulated price in case the market developed a little weakness or if for other reason it became undesirable to take the goods. Very little has been heard of this since the beginning of the year, but we have not infrequently encountered complaints from merchants that orders taken before the recent advances in price have been very slowly executed, although subsequent purchasers paying the higher prices have obtained the goods without much delay. As touching upon this subject the following letter from a gentleman prominently identified with the trade will be of interest:

To the Editor: It may be safely taken as a sign of improved commercial conditions and consequent advancing prices when "good faith" puts in its appearance as an expressed factor in business on the buyer's side. During years of depression it is liable to lie dormant or be forgotten as a potent agent to conjure with, and orders, even when definitely placed, are canceled *ad libitum* as though there were no obligation whatever except on one side. Even the most solemnly drawn specifications are playfully thrown off as memoranda or options if the price sags a little or the agreement becomes for any reason disadvantageous to the thrifty buyer, and good faith or any kind of faith is not once mentioned.

But let the market change as it has during the past few months, when the increment of every purchase becomes a valuable asset, and presto! the long and sadly neglected "good faith" puts in its appearance. No matter how attenuated the thread by which the order hangs, no matter how belated the date in the light of certain advances, or how unusually large the quantities as contrasted with previous experience, or how loosely such agreements were held in the past, there comes in against any remonstrance or proposition to reduce the order to reasonable proportions the solemn assurance that the specifications were "sent in good faith" and therefore ought to stand.

So it is not without its benefits in more ways than one this upward swing of the market, inasmuch as besides advancing labor and putting the calamity howlers to shame and setting them to work to devise new theories, it resurrects so important a factor in all deals between men, our old friend, "good faith." Our hope at such times is that he will be so thoroughly revitalized that he shall not die out or be forgotten when the pendulum swings the other way. Let those who are so anxious now to claim him as a recognized ally in the party of the first part or of the second part—it does not matter so much which—remember what a good turn he has done them in this day of advancing prices, and so hold firm to him when the time comes for "taking medicine."

Let him never more be banished from the board or kicked out of doors like a troublesome old interloper, but be party to every order and an abiding party to the transaction to its conclusion. We do not want to be called on to write his epitaph—he ought to survive among the very fittest.

Policy of A. G. Spalding & Bros.

To the Editor: In any discussion of Mr. Spalding's policy it must be taken for granted first of all that Mr. Spalding has but one object in view, and that is the furtherance of his own business interests. No impartial observer imagines that Mr. Spalding is so narrow as simply to be striking at the jobber. The fact is that Mr. Spalding—like all other business men—is trying to get more money for his goods, so that the whole point is, has he adopted a course which, in the light of experience, is going to benefit him in this direction?

HOW GOODS ARE SOMETIMES INTRODUCED.

It is not an uncommon thing for hardware manufacturers to go direct to the retail trade, but it is nearly always done in the beginning and with a view of introducing their goods. After that, the demand once established, recourse is almost invariably had to the jobber as the best distributor. It would be difficult to name an exception to this.

SUCCESSFUL MERCHANTS SELL UNIFORMLY CHEAP.

The statement that a jobber won't make money on his goods, and will cut them to pieces, is found upon examination to be a very superficial charge. The large jobber with a well organized business seems to thrive and increase and to be strengthening his position. He can only do this by making money, and in the end, both for his benefit and the benefit of his customers, it is necessary that he should make money. It is an invariable rule that the successful house is one, after all, which sells goods uniformly cheap. The man who is losing money cannot afford to do it. This was some time a paradox, but now the times give it truth.

RESTRICTED PRICE SCHEMES EVENTUALLY FAIL.

Mr. Spalding says that the jobber would not observe certain selling prices, and it is readily seen that Mr. Spalding's whole idea was to make the retailer pay a certain restricted price, and of course it failed, as all restricted price schemes do in the long run, since they are opposed to human nature.

FROM FRYING PAN INTO FIRE.

For the sake of argument let us say there are 250 jobbers in the United States, and yet there are enough of them who were recalcitrant and refused to observe Mr. Spalding's mandates. Mr. Spalding confesses his utter inability to enforce his views upon these same jobbers, so he is going to simplify the matter by going to 30,000 retailers, requesting them to observe a restricted selling price which he could not make 250 men observe. Does not the utter lack of practicability of a scheme of this nature need an extended argument? Isn't the retailer, after all, a rather more independent man than a jobber? Is he not more likely to follow his own way and do as he pleases?

A HYPOTHETICAL CASE.

Now, all the retailers are not going to handle Mr. Spalding's goods. The jobbers will certainly sell some other goods of similar nature. Suppose the Spalding retailer find himself confronted with the fact that his competitor across the street has similar goods of equal quality and at less prices? Is he going to let the business go by, or is he going to meet the competition? Suppose he does meet the competition and cuts Mr. Spalding's prices, what is Mr. Spalding going to do about it? He says he has means of compassing his ends. It would be interesting to know what they are. They would certainly be brand new to the business world. Suppose he does cut a dealer off? It is not a difficult matter for that dealer to buy the goods from some one else. It is done all the time and the manufacturers have confessed their inability to stop it.

CONTROLLING SOURCE OF SUPPLY.

Mr. Spalding's argument is that he will control the sources of supply, since he will control the retailer, seeing that the retailer cannot buy from a jobber, but he forgets that retailers have friends among the retailers, just as jobbers have friends among the jobbers, so a bunching of orders is a simple proposition.

A DIFFERENCE OF DEGREE, NOT KIND.

If Mr. Spalding's argument that he cannot control the jobbers, that they will cut his prices, that they get his goods anyhow, are logical as applied to jobbers, then they are even more logical as applied to the retailer. It is simply a difference in degree and not in kind. In other words, the retailers may be depended upon to pursue very much the same policy as the jobbers pursued.

RELIANCE ON TRADE MARK GOODS.

Mr. Spalding placed great stress on his trade-mark goods. Name and reputation certainly have great worth in the hardware business, but every man of experience knows that this is sometimes badly overdone, and that no name, no reputation, no quality counts very much when the other fellow is offering an equal quality and at less prices.

MUST MEET THE MARKET.

Every manufacturer is aware that in order to keep up his trade he must meet legitimate competition. Now the facts are—and those in the trade know them to be facts—that outside of a few important articles there is not an item made by Mr. Spalding that cannot be equally well duplicated by others. Not only can this be done, but it is being done. "The proof of the pudding is in the eating," and how long will trade be willing to pay more for merely a name and reputation? It takes something more than a trade-mark to keep up selling prices.

KODAK DISTRIBUTION NOT A PARALLEL CASE.

As regards this plan being successful in the case of kodaks that is a different story. The kodak in question is a patented article, and so long as the patent continues the makers of it can distribute it any way they will. It does not follow from this that they have chosen the best method.

HOW OTHER MANUFACTURERS DO.

If Mr. Spalding's effort to reach the consumer at the lowest possible price to him is his end, why was he so anxious to make the jobber maintain a selling price and keep the retailer from buying goods as low as possible? It must be remembered that Mr. Spalding was not alone in his position. There are a great many manufacturers in the hardware line all over the country who make an article which is sold to a large extent because of their name and reputation. Now these manufacturers manage to get along without restricted selling prices and by distributing their goods through the jobber, whom they regard as the best medium of distribution. They make a price to the jobber, and then it is his funeral as to whether he makes a profit on their goods or not. If he hasn't sense enough to do so, he is pretty apt to drop out of the race after a while. The manufacturers find that in this way the goods get to the consumer in a satisfactory manner, for, after all, the enduring strength of any brand of goods lies with the ultimate user, nor do these manufacturers find it necessary to degrade the quality of their goods. On the contrary, they are elevating it all the time.

HOW HARDWARE IS MAINLY DISTRIBUTED.

Finally Mr. Spalding's plan is interesting, in view of the fact that he seems to be trying to "drive up stream."

Just at present there are a great many large consolidations in the hardware business. They are being engineered by men of great experience and much brains, and almost without exception the policy has been to distribute their goods through the jobber. Why? Not because they expect either the retailer or consumer to pay more money for the goods—that would be foolish as well as unfair—but simply because the jobber can really, after all, reach the retailer and the consumer much cheaper than the manufacturer can ever hope to.

Jesse Wright has retired from the Hardware business at Fulton, N. Y., and A. J. Snow has bought the stock, which comprises Shelf and Heavy Hardware, Stoves and Furnaces, Tinware, Doors, Sash and Blinds, Paints, &c. Mr. Snow has given the store a modern appearance by putting in a plate glass front and new shelving throughout.

Francis Conlin has acquired all the stock of Conlin Hardware Company, Angleton, Texas, and is now sole proprietor. The business will be continued under the same corporate name under the management of C. E. Wells.

E. M. Bush Hardware Company, Evansville, Ind., have recently been incorporated with a capital stock of \$15,000. Their business is principally retail, though some wholesaling is carried on. They have just taken possession of a new three-story double building.

Trade Winning Methods.

This department will contain a description of approved methods of bringing customers to the store by means of newspaper advertising, circulars and such special expedients and methods as are found useful by enterprising and progressive Hardwaremen.

A cordial invitation is extended to merchants to co-operate in the effort to make it suggestive and of practical use to the trade.

TRADE WITH CARPENTERS AND BUILDERS.

H. C. W.

THE subject of trade with builders and contractors has lately been up for discussion. We live in a State void of lien laws that protect in such cases. We also have with us very many of the unreliable sort in the class of builder and contractor; the kind who if they "clear" on their job may pay, if they lose on it they never pay.

Our Laws

should most certainly have attention through the State Hardware associations, and more directly through solicitation of those who frame them. There are in some States laws for protection that are of real value; in our own, as stated, we are utterly without them. More losses occur from this one source of trade than any of us are willing to own to, and more possibly than from any other one source.

One of your correspondents says there are some reliable ones among them, which is true, but you can count them on your fingers in any city of from 10,000 to 50,000.

It is the one business that does not seem to require capital to found a line of credit.

The Anxious Seat for Trade

causes much of this. The contractor comes to you from another house where you know his credit has been exhausted, and where you know he is still owing. He pays you cash for the first few jobs, cash that should have gone to the other man. You finally feel that you can watch him and get out of him what the competitor did not, and begin to give him credit—only until the job is through with. It is the same old story, he finally and invariably gets you just as he does everybody else in the town.

Credit to Unworthy Men,

men who are positively dishonest, is allowed. The trouble starts with the architect in asking such men to figure on the job, and it does seem that no man who takes pride in his profession would be guilty of it, yet such is the case in every city we know. So long as we allow credit to men who make their boast that the job was taken for less than it is worth, just so long will we keep on charging their account balances each year to profit and loss, or to a hopeless suspense account.

The Saw and Hatchet Man

is put on a plane with the man who is an expert, who pays his bills, who has done business with you for very many years in a reputable way, and whom you are in honor bound to protect as against the fly by night contractor and builder. Doesn't it make you ache to go over these balances left by such men some night, and figure out what a hole it has made in your profits? Think of it, \$50 is 10 per cent. of profit, covering the entire sales to this worthless party for four or five good residences put up.

Our Experience

for a number of years was just the same as that of a great many others. We thought we could collect where

our competitors could not, and we are still collecting them. In every case we were caught at one time or another. We are afraid to say what it amounted to some ten years ago. We have this consolation—we quit it, we wiped all such men from our books, and so long as

we have control of them they shall not be dishonored with this class of accounts.

We Made Our Cure

in two ways—one was to forever and always and flatly refuse the unworthy contractor credit. The other and the better way has been to go to the man owning the building. We began this some years ago, and have found it full of satisfaction in every possible way. It leaves no hard feeling anywhere, it gives the owner much better Hardware, Glass, &c., it saves the contractor time in the selection of it, and ourselves time in helping to cheapen it, which he invariably wants to do unless specified by number, finish, &c., in closest detail.

Through the Architects

the larger part of it has been worked. We suggested to them that by leaving these items to the owners it would give them better and more satisfactory trimmings, and would relieve them of the necessity of specifying just what should go in. They fell in with it at once, and for a number of years, while furnishing by far the larger part of the better class of houses, we have not lost a dollar, and we have not a worthless contractor on our books. The contractor is glad to have it off his hands, the owner is more than glad to make his own selection, and, all in all, we believe it comes near the solution of how to avoid the irresponsible carpenter, builder and contractor.

DOES IT PAY FOR RETAILERS TO ADVERTISE.

A Merchant's View.

One of your correspondents says that he has been struggling with the question, "Does advertising pay?" It is not strange that this firm have been worrying over this point. It is a question which every Does It Pay? advertiser should ask himself, and he should not be too optimistic in answering it, either. He should be sure that it pays or sure that he is pursuing a course that will ultimately bring adequate returns. Advertising is investment, not expense. It should be as carefully and rigidly dealt with as any other investment.

The writer says that he has tried advertising for the past year, but is not quite sure that results have been satisfactory. In other words, he is quite sure that results have not been adequate. How Is It Done? Where's the fault? He doesn't say in what manner he has been advertising. He doesn't tell us what media he has employed. He gives us no samples of his advertisements. We do not know what conditions surround his business. We do not know to what class of people he must appeal for trade. Does he forget that all of these points have a direct bearing upon his advertising plans?

To say that advertising always pays would be wrong. To say that advertising always does not pay would be equally wrong. Thousands of dollars have been lost in advertising; yet thousands have been made with the aid of it. Advertising, to-day, is bringing handsome returns to many advertisers, and there are those who are losing by it. The difference between the right and the wrong of it makes a corresponding difference in

Money Made
or Lost.

license and assignment made by the St. Louis Stamping Company to the former defendants in the Mottled Enamelled Ware litigation against the Haberman Mfg. Company of New York and Matthai, Ingram & Co. of Baltimore, Md., are null and void, have this week filed with the clerk of the Circuit Court of the United States, Southern District of New York, a bill of complaint for injunction and damages against the National Enameling & Stamping Company, who have absorbed the former defendant companies. The Lalance & Grosjean Mfg. Company state that it is their intention to carry the case to the Supreme Court of the United States, to bring to a final determination the question as to what are the rights of a co-owner under a patent.

Requests for Catalogues, Quotations, &c.

H. N. WELCH & CO. have purchased the stock of **A. Milne & Co.**, Winnebago City, Minn., and will continue at the old stand. The store will be thoroughly refitted and enlarged and a full line of Hardware, Tinware, Stoves, Sporting Goods, &c., carried. Copies of catalogues, price-lists, &c., will be valued.

Robert C. Witte, who opened a store at 261 Main street, Hartford, Conn., in August of last year for the sale of Hardware and Cutlery, has just made a 30-foot addition to the rear of his store, in order to take care of his increasing business. Mr. Witte is desirous of having catalogues and price-lists relating to Hardware, House Furnishing Goods, Paints and Oils, &c.

Edward A. O'Donnell, formerly of Eager & O'Donnell, Jermyn, Pa., has just opened a store at New Orange (Post Office, Roselle), N. J. Mr. O'Donnell is handling Builders' Hardware, Stoves and Tinware, and also conducts a plumbing and tin shop. He will be pleased to have manufacturers send him copies of price-lists, catalogues, &c.

Lon A. Pelton, Fremont, Wash., successor to **A. D. Grow & Co.**, plumbing, tinning, galvanized and sheet iron work, roofing, guttering, &c., has taken in a partner and will put in a full line of Hardware. Catalogues, quotations, &c., will be appreciated from manufacturers and jobbers.

The old firm of **S. S. Fox & Co.**, Marion, Ohio, have been reorganized and a stock company formed, under the laws of the State of Ohio, with a capital stock of \$15,000. The new concern will be styled the **Marion Department Company**, with **S. S. Fox** as president and general manager, **W. H. Albright**, vice-president, and **S. A. Lyon** as secretary and treasurer. It is the intention of the new company to run a complete and up to date department store. They have secured a long lease on the quarters adjoining those they now occupy, and will arch the two stores, which will give them three floors, 40 x 135 feet. Their stock will include Hardware, Stoves, Crockery, Furniture, Carpets, Curtains, with Slate and Tin Roofing department. The company request catalogues, &c., from the trade.

Among the Hardware Trade.

The **Elgin Hardware Company**, Elgin, Ill., have been incorporated with a capital stock of \$3000. **Chas. Hallgarth**, **H. L. Buell** and **J. W. Rhodes** are the incorporators.

Ranger & Hilbish have dissolved partnership in the Hardware business at Harvey, Ill., and **D. H. Hilbish** is now continuing under his own name.

James A. Boyce, Hardware merchant at Byron, N. Y., is intending to erect a new store.

Nelson & Voorhees, Marble Rock, Iowa, have dissolved partnership. **W. L. Nelson** is now sole proprietor of the business.

C. N. Boorn has purchased the Hardware and Farm Implement business of **E. H. Lake** at Sturges, Mo.

H. B. Seagrave, Hardware and Stove merchant, Pontiac, Mich., has bought the **Gnau Hardware** stock, 185 Gratiot avenue, Detroit. Mr. Seagrave has also purchased the **House Furnishing Goods and Building Hardware** stock of **Hodgson, Howard & Marks** of the same city. He will consolidate the two stocks, sort one good stock out and auction the balance. Mr. Seagrave has closed out his business at Pontiac to **Rich & Hallett**.

J. C. Hill has sold his business at New Whatcom, Wash., to **W. M. Frizell** and **J. P. Nelson**, who will incorporate under the style of the **W. M. Frizell Hardware Company**. Mr. Frizell has been engaged in business at New Whatcom for the past 10 years.

J. E. Leatherman is successor to **Joseph Tod**, Throntown, Ind., dealer in Hardware, Farm Implements, Buggies, Wagons, &c.

The store of **Chas. Hummel & Son**, San Antonio, Texas, was robbed a short time since of about \$200 worth of Revolvers. The burglar was subsequently arrested and sentenced to 14 years' imprisonment.

J. Blakey & Co. have purchased the Hardware business of **C. P. Wilson & Co.**, Ennis, Texas, and the firm style will hereafter be **Ennis Hardware Company**.

E. S. Newitt, De Ruyter, N. Y., has removed his Hardware stock into new quarters.

Cox & Lyon, Hardware merchants, 776 Chapel street, New Haven, Conn., who report business as excellent, are making a specialty of supplying Garden Hose of any length required in one piece.

F. W. Parsons has embarked in the retail business at Dexter, Maine, handling a well assorted line of Hardware, Paints, Oils, Sporting Goods, Carriage Stock, Lime, Cement, Glass, &c.

The partnership between **Amos M. A. Miller** and **F. Willard Jeffries**, under the firm name of **Miller & Jeffries**, Hicksville, Ohio, was dissolved on March 1. Mr. Jeffries will continue at the old stand under his own name.

C. Klassen has disposed of his interest in the firm of **C. Klassen & Son**, Granville, Iowa, to **N. H. Graff**, and the business will be continued by Mr. Graff and Mr. Klassen's son, **John P. Klassen**, under the style of **Klassen & Graff**, in the corner building opposite the old stand. In addition to Hardware, Stoves and Tinware the new firm will carry a full line of furniture.

The **Clayton Hardware Company** have lately opened up in business at Central City, Neb., under the management of **W. L. Clayton**.

Abell, Phillips & Co., Hardware merchants, Allegan, Mich., have purchased that part of **R. C. Turner's** business as covers Shelf Hardware, Tinware, Plumbing Goods, Sewer Pipe, &c.

W. C. Briggs and **J. H. Berkheimer** have purchased the Hardware business of **Aslakson Bros.**, Park River, N. Dak., and will continue at the old stand under the style of **Briggs & Berkheimer**.

James Havlik, Linwood, Neb., is erecting a new store and tinshop, of which he expects to take possession about July 1. Mr. Havlik carries a stock consisting of Shelf and Heavy Hardware, Tinware and Sporting Goods.

The Hardware and Implement store of **Wm. McEndree & Co.**, Minden, Iowa, was recently destroyed by fire.

Beurgan & Freed, Moline, Kan., have admitted to partnership in their Hardware and Lumber business **Geo. H. Turner**, who for about six years has been assistant cashier of the **Moline State Bank** of that city, and the style has been changed to **Beurgan, Freed & Turner**.

A. C. Neufeld, Henderson, Neb., has disposed of his Agricultural Implement stock, intending to confine himself to the sale of Hardware, Stoves, Sporting Goods, &c., in the future.

S. A. Greenwood, manager of the business, has bought the interest of **A. J. Hilton** in the **Erwin Hardware & Implement Company**, Erwin, S. Dak. The style will continue as before.

Everts Bros. & Pomeroy have succeeded Everts Bros. at Auburn, N. Y. The business is wholesale and retail Hardware, Stoves, Tinware, Paints, Oils, &c., and about \$25,000 is invested. The firm occupy a store 20 x 187 feet, with two basements of the same dimensions. They also have a tinshop, 30 x 50 feet, two stories high.

H. M. Sanders & Co., Boston, Mass., whose store at 27 Eliot street was badly damaged by fire on March 24 and who have since been occupying temporary quarters at 34 Kneeland street, have completed repairs on the injured building and are now in possession, with a brand new stock of everything in the Hardware line.

Loda Hardware Company have succeeded R. Cruzen & Co. at Loda, Ill.

Bussel Bros. have moved their stock from Blue Ridge to Mt. Moriah, Mo.

L. I. Hackett has purchased the interest of Wm. Lichtenberger in the Hardware business of Hackett & Lichtenberger at Freeport, Ill., and is continuing at the old stand under the style of Hackett Hardware Company.

The Drake Hardware Company, Rockford, Ill., have incorporated with a capital stock of \$5000, Oliver Drake, D. C. Mutimer and Clyde Webber being incorporators. The company have put a new front on their store and have also embellished the interior.

J. H. McCollom has succeeded McCollom & Merriell at Hope, N. Dak.

L. O. Weltmer is the proprietor of a new store at Cora, Kan. Mr. Weltmer's stock comprises Shelf Hardware and Tinware.

Lewis & Meter have succeeded Bolitho & Lewis at Richfield, Utah.

W. G. Browning's Sons are successors to W. J. Starr in the Hardware business at East Greenwich, R. I. For many years previous to Mr. Starr's coming into the ownership, five years ago, the business was conducted by Wm. G. Browning and later by Wm. G. Browning & Son.

A. & O. A. Hucke, Belleville, Ill., are constructing a brick addition, 23 x 50 feet, to their present quarters. They report a growing trade in Stoves and House Furnishing wares. The demand for Shelf Hardware and Outdoor Implements is also referred to as very good.

R. J. Bennett has bought the stock of H. C. Wilcox, at West Concord, Vt.

Miscellaneous Notes.

Hack Saws.

The L. S. Starrett Company, Athol, Mass., in a leaflet call attention to the hack saw blades they are manufacturing. Saws for common use have 15 teeth to the inch except the 12, 14 and 16 inch, which have 13 teeth. Saws for tubing and bicycle work have 24 teeth to the inch, made in nine sizes, 6 to 16 inch, inclusive. Saws with extra fine teeth, 30 to the inch, are made in 8 and 9 inch sizes only.

L. D. Parkhurst Cutlery.

L. D. Parkhurst, Danielson, Conn., is manufacturing a new line of cutlery, which includes shoe, bread, oyster, putty, rubber, paper, butcher, banana and kitchen knives which have some distinctive features. The No. 1 grade are all put up with improved solid end ferrules, are warranted not to break off nor work loose in the shank and are referred to as first class in stock, temper and finish. Especial attention is directed by the manufacturer to the knives for cutting rubber and leather, particularly to their cutting qualities.

Cloth Covered Trousers Guard.

Bevin Bros. Mfg. Company, East Hampton, Conn., are manufacturing a cloth covered trousers guard for cyclists. It is less conspicuous than the enameled styles, and has a clinging tendency which causes it to keep its position.

Toy Lawn Mower.

Arcade Mfg. Company, Freeport, Ill., are making a toy lawn mower about 12 inches long over all, which is a very realistic reproduction of the genuine article, and well calculated to amuse a child without any risk of injury.

X-Ray Lemon Squeezer.

Freeport Novelty Company, Freeport, Ill., are manufacturing the X-Ray lemon squeezer here illustrated. The plunger is solid aluminum and spiral in form, so that it worms its way into the lemon and allows the juice to follow the thread, making a good drainage. The standard has an auxiliary handle to grasp when operating and screw holes are provided at the bottom to fasten perma-



X-Ray Lemon Squeezer.

nently if desired. The squeezer has a shifting fulcrum. When the handle is up to receive the lemon, which should be so loaded to get the benefit of the shifting fulcrum, the pivots are forward and are drawn back as the pressure is applied, permitting the fruit to adjust itself to the plunger, thus getting all the juice with one squeeze. The juice flows from the strainer free from seeds or pulp. The plunger and strainer is detachable, and it can be lifted out to rinse after using.

Rogers' New Chain Fastening Yoke.

The accompanying cut is of an animal yoke offered by Rogers Mfg. Company, Harper, Kan. The device is to prevent animals getting under or between the wires of fences. The adjustable clamp in the nose pulls back on the nose when the hooks above and below the head catch on the wires, causing the animal to back and desist from the attempt to force its way through. The point is made



Rogers' New Chain Fastening Yoke.

that the yoke does not irritate or prevent animals grazing, drinking or fighting flies. The yoke is made in four sizes—bull, cow, medium and calf. It is remarked that a calf with such a yoke on cannot suck a cow. The yoke is also made with a hook at the top, but none at the bottom. Halters are made without either hook and without the nose clamp. They are of galvanized wire and chain, easily put on or taken off, and are referred to as being strong, durable, light, cheap and warranted to give satisfaction.

Ray Hubbell, successor to the Globe Metallic Binding Company, Northville, N. Y., and manufacturer of Ray Hubbell's metallic binding and corners for oil cloth, advises us that the demand continues to grow and that they are now well known as a household article in the United States and Canada. Mr. Hubbell also makes matting ends and stair corners and brass and zinc nosing.

Daisy Call Bells.

Bevin Bros. Mfg. Company, East Hampton, Conn., have put on the market the Daisy call bells, Nos. 72 and 74, the former of which is here illustrated. They are especially suitable for school purposes, as they are not easily injured. Both have bases $3\frac{3}{4}$ inches in diameter



Daisy Call Bell No. 72.

of wrought instead of cast metal, being thus less liable to break if dropped or misused. The cut shows the No. 72 pattern, both base and gong being of wrought steel, finely polished and heavily nickeled on copper. No. 74 has a base of wrought brass with a gong of improved design made of cast bell metal, both base and gong being handsomely nickeled.

Victor Screwless Door Knob.

The accompanying illustrations show the construction of the Victor screwless door knob, manufactured by L. T. Snow, New Haven, Conn. The mechanism is simple and can be easily understood and operated by persons of average skill, the cost of the knob being little if any more than the ordinary or side screw knob. Particular attention is called to the fact that it is manufactured in all grades of jet, porcelain, wood and bronze, and in all styles

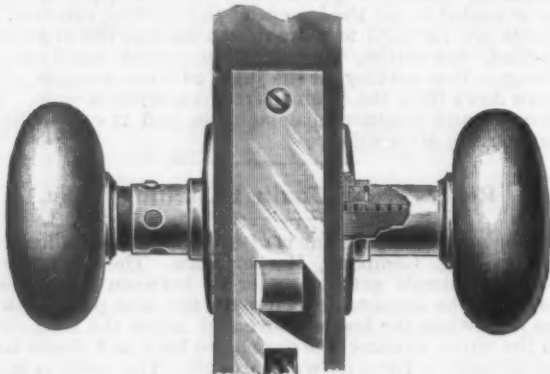


Fig. 1.—Victor Screwless Door Knob.

of finish, and can be used with any make of knob lock. One of the knobs is made fast to the spindle and is provided with a movable sleeve, which in position for applying to the door is drawn back to the base of the knob neck. This sleeve is capable of extension beyond the end of the knob neck and has a series of holes at varying distances from its inner end adapted to receive a locking pin located in the neck of the knob. The opposite knob moves freely on the spindle. In the neck of this knob is a latch, which, the spindle having been passed through the door and the knob run on, can be shut into one of the series of notches, securing the knob in a position of comparative adjustment to the door. The sleeve on the fast knob is then moved out toward the door, drawing the latch knob



Fig. 2.—Movable Sleeve and Locking Pin.



Fig. 3.—Latch on Free Knob.

forward and securing the latch under the flange of the rose. The locking pin engages automatically with one of the holes in the sleeve and completes the adjustment to the door, locking all the parts in solid engagement with each other, thus avoiding all play and consequent wear. The knob, when adjusted to the door, cannot be removed from the outside. Mr. Snow is also manufacturing a line of Victor mortise knob locks constructed on a new ar-

range of lever action, having the latch in a line with the knob, and so arranged as to require a very short movement of the knob in operating the latch, saving wear on both lock and knob and making it much pleasanter to the hand in opening or closing the door. Combined rose and escutcheons of wrought bronze and steel of new designs will also soon be added to the line. The manufacturer will on request forward sample knobs to parties interested. Samples of the goods can also be seen at New York office, 107 Chambers street, E. G. Shepard, agent.

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New Hardware Store Fixtures.

The Dempsey Mfg. Company of Fayette, Mo., are placing upon the market a new sample holder and a new line of hardware cabinets especially designed for table cutlery, spoons, files and other small articles usually shown in an ordinary counter showcase, as illustrated in Fig. 1. Fig. 2 shows the Dempsey sample holder in position, equally well adapted, it is claimed, to hold large and odd shaped

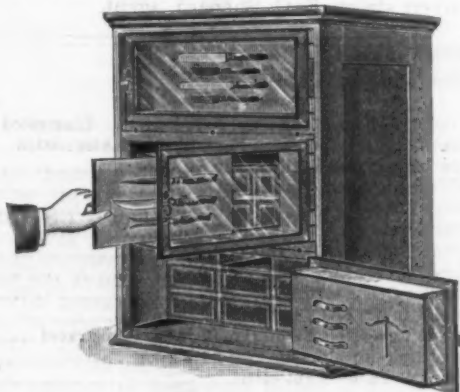


Fig. 1.—The Dempsey Hardware and Cutlery Cabinet.

articles, such as molasses gates, steam gauges, door knobs, &c., as well as small and regularly shaped articles, such as files, door bolts, escutcheons, &c. The sample holder is made of fine spring steel and polished brass wire. The spring is strong and flexible, and so constructed as to have a lateral tension sufficient to hold even the heaviest goods firmly and close to the front of the box or drawer, and at the same time not strong enough to make it difficult to release the article displayed. The company refer to the extreme simplicity of the holders, and state that they will hold any and every kind of shelf hardware, no matter what its size or shape, from a cambric sewing needle to a molasses gate, as shown in Fig. 2; also that the small polished brass wire hook that holds the sample in place does not obstruct the view or mar the sample displayed. The cut also illustrates the manner of detaching and replacing the sample by simply pressing on the spring. It is claimed that by using these sample holders goods can be more

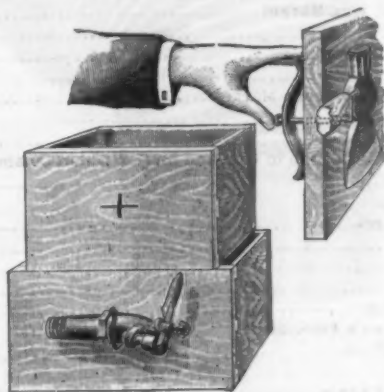


Fig. 2.—The Dempsey Sample Holder.

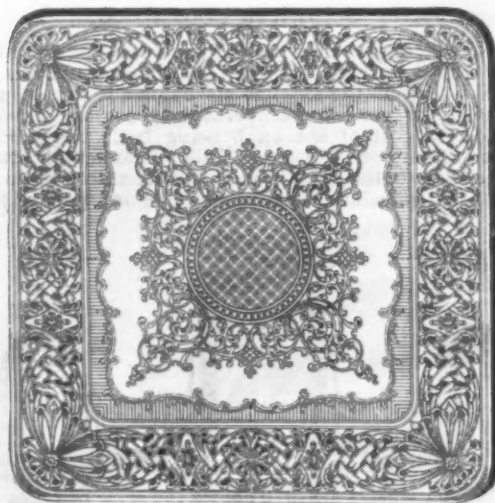
effectively and attractively displayed, and that samples can be shown and sold, thus avoiding the accumulation of shelf worn and tarnished goods, while saving many times the cost of the holder.

Fig. 1 illustrates a new line of hardware and cutlery cabinets. The cut shows their No. 1 table cutlery cabinet, this being the smallest size made by the company, and contains three 6 x 12 inch Dempsey display doors, and will display from 12 to 24 patterns of knives, forks, spoons, files, pliers or other small articles in a very neat and attractive manner, and carry stock for several gross of the goods shown. The size of this cabinet is 15 inches wide, 15 inches deep and 24 inches high. The workmanship, it is stated, is of the best, and the cabinets are finished in oak, ash, cherry or walnut, the doors being fitted with detachable sample boards and glazed with a good quality of glass. A larger size, No. 2, is 28 inches wide, 28 inches high and 14 inches deep, has six patent steel and glass display doors with detachable sample boards and has twice the capacity of No. 1. It is made in imitation cherry, oak, ash or walnut, also of real oak, ash, cherry or walnut. The company state that they are prepared to

make any size desired by the trade and fit them with their patent display doors; size of doors either 6 x 12 inches or 9 x 12 inches. The display doors are made of cold roll steel and finished in any desired plating, nickel, bronze or old copper, or enameled in any desired color. Attention is called by the company to the beauty and attractiveness of the cases and the ease and quickness of arranging a catchy new and novel display of a large class of fine goods; also to the fact that by means of the detachable sample board the trade is much easier waited upon, and that the sample boards instead of the goods are handled, while the goods displayed are always in plain and attractive sight and protected from dust, dirt and moisture by the glass doors. The claim is made that while the cases are well made and finely finished, they are cheaper and better than the ordinary counter case, that they take up less room and have greater displaying space than other cabinets, that the sample boards can be printed with the trade-mark and firm name of the jobber or manufacturer handling them, thus keeping their name and trade-mark in perpetual and pleasing view. The back of every sample board has a large memoranda surface where the number, size, price, date of invoice and other data can be kept. Special sizes and designs can be made and furnished on short notice.

Antique Coppered Steel Stove Board.

Wabash Screen Door Company, Rhinelander, Wis., are making a line of stove boards, one of which is illustrated in the accompanying cut. It is known as their Antique coppered steel board, and is made in both



Antique Coppered Steel Stove Board.

wood and paper lined, square and oblong, in regular sizes. Wood and paper lined crystallized boards are also made by the company.

Common Sense Re and De Capper.

The Bridgeport Gun Implement Company, 313-315 Broadway, New York, are putting the re and de capper, shown in the accompanying cut, on the market. It is so



Common Sense Re and De Capper.

constructed, it is pointed out, that the needle adjusts itself to whatever shell the sportsman may desire to extract a primer from. It is explained that if the needle needs to be long for one shell, or short for another, this length is regulated automatically without any adjustment by the user. The needle, being protected by a movable sleeve, adapts itself to the desired length required for

extracting a primer the moment pressure is brought upon it. It is also so protected by the movable sleeve that there is no danger of breaking the needle. The movable sleeve or holder is supported by a spiral spring, to enable it to automatically adjust itself to different lengths of shells and depth of primer pockets. The manufacturers state that there is no shell, either foreign or domestic, with a central orifice that the extracting needle can enter that the decapper will not successfully take off the primer,



Star Nail Puller.

without the sportsman giving any thought whatever in regard to adjustment; and that without any adjustment it will answer equally well for capping or decapping shells of both 10 and 12 gauge.

Style K. R. B. Lawn Mower.

The accompanying illustrations show the new lawn mower which the Philadelphia Lawn Mower Company, 3107-3109 Chestnut street, Philadelphia, are bringing out. The principal feature embodying novelty is to be found in the bearings. Fig. 1 shows the mower with five blades

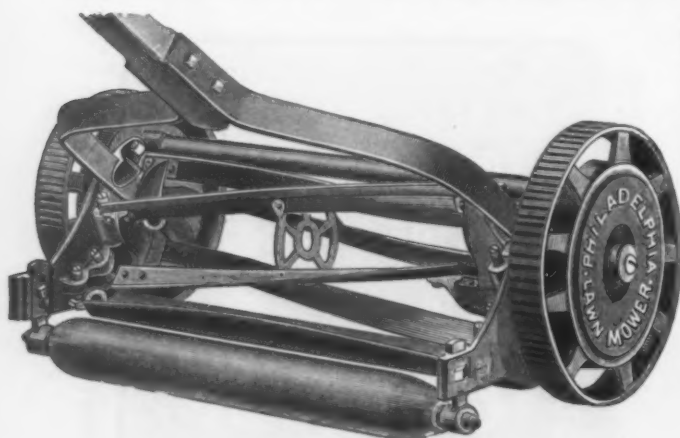


Fig. 1.—Style K. R. B. Lawn Mower.

and 10 inch wheels Fig. 2 shows the style of roller bearing used. The rollers are hollow, made of spiral steel, and are held in position by a retainer. An adjusting cap is used on the bearing surface, having a split cover and an adjusting screw to take up the wear of the journal. The method of adjustment is practically the same as that used on all mowers made by the company. It is claimed that roller bearings in mowers have many advantages over ball bearings, among them that there are no caps to wear out,

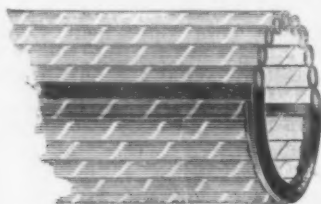


Fig. 2.—Mower Roller Bearings.

or balls to break; that while in ball bearings the actual bearing amounts only to a pin point, the roller bearing, presents a surface of $1\frac{1}{4}$ inches; that the roller bearing being longer, the wear is distributed evenly over the surface of the journal; that ball bearings adjust on the ends only, while the adjustment of the roller bearing is complete, and that an expert is not required to adjust the roller bearing. The mower is made in four sizes, 14 to 20 inches.

Nichols Bros., Greenfield, Mass., are sending to their customers a handsome steel hanger showing a butchers' knife, cleaver and steel, embossed and in colors. This sign is intended to be displayed in hardware stores or show windows, and it is an attractive and conspicuous advertisement.

Star Nail Puller.

The Atwater Mfg. Company, Southington, Conn., are putting on the market the nail puller here shown. The jaws and shank are formed from two strips of half round metal, offset so as to form the truss construction. No spring other than the natural spring of the metal is used to throw the jaws open. The foot consists of two plates so riveted together that they will pass on opposite sides of

the jaws. In the plates are inclined slots, and extending through the slots and fixed to the jaws is a pin so located that as the jaws are turned or the foot is lifted the slot will ride forward over the pin forcing the jaws together. It is explained that in operation the jaws are placed on opposite sides of a nail with the outer end of the foot suitably supported. The handle is then forced downward, drawing the jaws together, forcing the nose of one jaw into the wood and below the head of the nail. The other jaw slightly bends the upper end of the nail forward, and when the shank is pulled backward in withdrawing the nail the pressure upon the nail is in the opposite direction from the downward pressure, so that the upper end of the nail is bent back into its former position, being, it is explained, otherwise gripped and withdrawn in the usual manner, the nail being drawn nearly straight. As soon as the nail is released the jaws under their natural spring will separate, and so normally stand in open position. The manufacturers state that the puller is strong, simple and effective.

Perfect One-Piece Stove Pipe Elbow.

Sidney Shepard & Co., Buffalo, N. Y., are offering their Perfect one-piece stove pipe elbow, as shown here-



Perfect One-Piece Stove Pipe Elbow.

with. The seam is in the throat, where, it is remarked, the elbow is the strongest, and not on the back, where it would mar its beauty and symmetry. This feature is referred to as insuring a smooth and handsome appearance for the back of the elbow, without a seam or break.

The J. D. Warren Mfg. Company, Masonic Temple, Chicago, have issued a profusely illustrated circular setting forth a large number of combinations of shelving which can be made by means of the Warren patent glass front drawer sectional hardware shelving of their manufacture. The combinations are of a character fitted for all classes of goods carried by hardware manufacturers. They show the arrangement of shelving for the usual classes of hardware and combinations suitable for tinware, for tea and coffee pots, lamps, sporting goods and also special arrangements, such as the Warren tilting front bolt case, drop front compartment cabinet, interchangeable bolt and hardware cabinet, nail bins and counters, &c. With the assistance of this circular a hardware merchant is enabled to select not only the particular styles of shelving suitable to his purpose, but also to determine what amount of space they will take and their cost. One of the points made by the company is that with the use of their shelving years of study are no longer required to "know the stock" of a hardware store, the selling of hardware being made comparatively easy for the inexperienced merchant or clerks.

MAY 10, 1899.

In the present condition of the market while many advanced prices are announced by manufacturers. In many cases lower prices are made by the wholesale trade who have stocks on hand purchased at former quotations.

1

Tanged and Miscellaneous.

Buck Bros. 90¢
Charles Buck 30¢
Tanged Firmers 40¢
L. & J. White, Tanged 140¢
Cold Chisels, fair quality 130¢
Cold Chisels, ordinary 70¢

Chucks—

Beach Pat., each \$3.00 20¢
Graham Patent 33¢
Morse's Adjustable, each \$7.00 25¢
Syracuse, Balz Pat. 30¢
Kinner Patent Chucks:
Combination Lathe Chucks 40¢
Drill Chucks 30¢
Independent Lathe Chucks 40¢
Improved Planer Chucks 20¢
Universal Lathe Chucks 40¢
Union Mfg. Co.:
Combination 40¢
Czar Drill 30¢
Geared Scroll 33¢
Independent 40¢
Union Drill 30¢
Universal 40¢
Face Plate Jaws 35¢

Clamps—

Adjustable Cincinnati 25¢
Adjustable, Hammers 20¢
Adjustable, Stearns' 30¢
Cabinet, Sargent's 45¢
Carriage Makers, P. S. & W. Co. 40¢
Carriage Makers, Sargent's 50¢
Best, Parallel 33¢
Cincinnati Carpenters 35¢
Joiners' Clamps, Tatum's 25¢
R. L. Tool Co.'s Wrought Iron 35¢
Saw Clamps, see Vises, Saw Files
Stearns Malleable, with Wrought Iron Screw 75¢
Stearns Steel 75¢
Tatum's Joiner's Adjustable 25¢
Tatum's Quilt, Cabinet, &c. 40¢
Warner's 40¢

Cleaners, Walk—

Star Socket, All Steel 40¢
Star Shank, All Steel 37¢

Cleavers, Butchers'—

Poster Bros. Flat Hds., 80¢; Rd. Hds., 40¢
New Haven Edge Tool Co. 40¢
Nichols Bros., Flat Hds., 80¢; Rd. Hds., 40¢
Fayette R. Plumb 38¢
P. S. & W. 38¢
L. & J. White 25¢

Clippers—

Chicago Flexible Shaft Company:
Handy Toilet 72¢
Mascoite Toilet 83¢
Monitor Toilet 90¢
Stewart's Patent 100¢
Hotchkiss Horse Clippers 70¢
No. 10, 118; No. 30, 150; No. 22, 135; No. 20, 130; No. 8, 100.
Hotchkiss Toilet Clippers 70¢
No. 1, 90; No. 101, 100; No. 201, 100; No. 800, 110; No. 500, 115.

Clips, Axle—

Eagle and Superior 1/4 and 5/16 Inch 75¢
Norway, 1/4 and 5/16 Inch 75¢

Cloth and Netting, Wire—

See Wire, &c.

Cocks, Brass—

Hardware List (Globe, Kerosene, Lever Bibbs, Racking, &c.) 70¢

Coffee Mills—See Mills, Coffee.**Collars, Dog—**

Brass, Pope & Stevens' list 40¢
Chapman Mfg. Company, new list 40¢
Embossed, Gilt, Pope & Stevens' list 30¢
Leather, Pope & Stevens' list 40¢

Combs, Curry—

Hotchkiss, List No. 20, '98 95¢
New Centaur Spring Curry Comb: With Wire Handle 81¢
With Strap Handle 81¢

Compasses, Dividers, &c.

Ordinary Goods 70¢
Bemis & Call Hdw. & Tool Co.:
Dividers 65¢
Callipers, Call's Patent Inside 55¢
Callipers, Double 70¢
Callipers, Inside or Outside 70¢
Callipers, Wing 60¢
Compasses 50¢
J. Stevens & Co. 25¢

Coolers, Water—

S. S. & Co.: 2-gal., \$2.70; 3-gal., \$3.30; 4-gal., \$3.60; 6-gal., \$4.75; 8-gal., \$7.20; 11-gal., \$11; 14-gal., \$14 each 60¢

Coopers' Tools—

See Tools, Coopers'.

Cord—Sash—

Braided, Drab and Fancy 20¢

Braided, White 14¢

Cable Laid Italian 18¢

Common India 18¢

Cotton Sash Cord, twisted 13¢

Patent Russia 13¢

Cable Laid Russia 13¢

India Hemp, Braided 11¢

India Hemp 10¢

Pearl Braided, cotton 16¢

Manchurian, White 13¢

Edystone Braided Cotton 17¢

Harmony Cable Laid Italian 18¢

Oryswan Mills:
Crown, Solid Braided White 18¢

Braided, Giant, White 16¢

Peel's:
Cable Laid Italian 18¢

Cable Laid Russian 13¢

Cable Laid India 13¢

Braided India 18¢

Samson:
Braided, Drab Cotton 33¢

Braided, Italian Hemp 31¢

Braided, Linen 33¢

Braided, White Cotton 27¢

Silver Lake:

A quality, Drab, 40¢
A quality, White, 35¢
B quality, Drab, 35¢
B quality, White, 30¢
Italian Hemp, 40¢
Linen, 37¢

Wire, Picture—

Braided or Twisted 85¢

Corn Knives and Cutters—

See Knives, Corn.

Crackers, Nut—

Acme, Japanned 40¢
Acme, Nickel Plated 30¢
Turner & Seymour Mfg. Co. 50¢

Cradles—

Grain 55¢

Crayons—

White Round Crayons, gross 50¢
Cases, 100 gr., \$4.50; \$5.00, at factory.
D. M. Steward Mfg. Co.:
Metal Workers' 20¢
Railroad 20¢
Rolling Mill 20¢
Soapstone Pencils 20¢
See also Chalk.

Creamery Pails—See Pails.**Creamery.****Crooks, Shepherds'—**

Fort Madison, Heavy 70¢
Fort Madison, Light 65¢

Crow Bars—See Bars, Crow.**Cultivators—**

Victor Garden 100¢

Curry Combs—

See Combs, Curry.

Cutters—Meat—

American 90¢
Nos. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
Each 25¢
Connecticut, No. 0, \$2.00; No. 1, \$2.50; No. 2, \$3.00; No. 3, \$3.50; No. 4, \$4.00; No. 5, \$4.50; No. 6, \$5.00; No. 7, \$5.50; No. 8, \$6.00; No. 9, \$6.50; No. 10, \$7.00; No. 11, \$7.50; No. 12, \$8.00; No. 13, \$8.50; No. 14, \$9.00; No. 15, \$9.50; No. 16, \$10.00; No. 17, \$10.50; No. 18, \$11.00; No. 19, \$11.50; No. 20, \$12.00; No. 21, \$12.50; No. 22, \$13.00; No. 23, \$13.50; No. 24, \$14.00; No. 25, \$14.50; No. 26, \$15.00; No. 27, \$15.50; No. 28, \$16.00; No. 29, \$16.50; No. 30, \$17.00; No. 31, \$17.50; No. 32, \$18.00; No. 33, \$18.50; No. 34, \$19.00; No. 35, \$19.50; No. 36, \$20.00; No. 37, \$20.50; No. 38, \$21.00; No. 39, \$21.50; No. 40, \$22.00; No. 41, \$22.50; No. 42, \$23.00; No. 43, \$23.50; No. 44, \$24.00; No. 45, \$24.50; No. 46, \$25.00; No. 47, \$25.50; No. 48, \$26.00; No. 49, \$26.50; No. 50, \$27.00; No. 51, \$27.50; No. 52, \$28.00; No. 53, \$28.50; No. 54, \$29.00; No. 55, \$29.50; No. 56, \$30.00; No. 57, \$30.50; No. 58, \$31.00; No. 59, \$31.50; No. 60, \$32.00; No. 61, \$32.50; No. 62, \$33.00; No. 63, \$33.50; No. 64, \$34.00; No. 65, \$34.50; No. 66, \$35.00; No. 67, \$35.50; No. 68, \$36.00; No. 69, \$36.50; No. 70, \$37.00; No. 71, \$37.50; No. 72, \$38.00; No. 73, \$38.50; No. 74, \$39.00; No. 75, \$39.50; No. 76, \$40.00; No. 77, \$40.50; No. 78, \$41.00; No. 79, \$41.50; No. 80, \$42.00; No. 81, \$42.50; No. 82, \$43.00; No. 83, \$43.50; No. 84, \$44.00; No. 85, \$44.50; No. 86, \$45.00; No. 87, \$45.50; No. 88, \$46.00; No. 89, \$46.50; No. 90, \$47.00; No. 91, \$47.50; No. 92, \$48.00; No. 93, \$48.50; No. 94, \$49.00; No. 95, \$49.50; No. 96, \$50.00; No. 97, \$50.50; No. 98, \$51.00; No. 99, \$51.50; No. 100, \$52.00.
Home No. 1, 20¢; No. 2, 25¢; No. 3, 30¢; No. 4, 35¢; No. 5, 40¢; No. 6, 45¢; No. 7, 50¢; No. 8, 55¢; No. 9, 60¢; No. 10, 65¢; No. 11, 70¢; No. 12, 75¢; No. 13, 80¢; No. 14, 85¢; No. 15, 90¢; No. 16, 95¢; No. 17, 100¢; No. 18, 105¢; No. 19, 110¢; No. 20, 115¢; No. 21, 120¢; No. 22, 125¢; No. 23, 130¢; No. 24, 135¢; No. 25, 140¢; No. 26, 145¢; No. 27, 150¢; No. 28, 155¢; No. 29, 160¢; No. 30, 165¢; No. 31, 170¢; No. 32, 175¢; No. 33, 180¢; No. 34, 185¢; No. 35, 190¢; No. 36, 195¢; No. 37, 200¢; No. 38, 205¢; No. 39, 210¢; No. 40, 215¢; No. 41, 220¢; No. 42, 225¢; No. 43, 230¢; No. 44, 235¢; No. 45, 240¢; No. 46, 245¢; No. 47, 250¢; No. 48, 255¢; No. 49, 260¢; No. 50, 265¢; No. 51, 270¢; No. 52, 275¢; No. 53, 280¢; No. 54, 285¢; No. 55, 290¢; No. 56, 295¢; No. 57, 300¢; No. 58, 305¢; No. 59, 310¢; No. 60, 315¢; No. 61, 320¢; No. 62, 325¢; No. 63, 330¢; No. 64, 335¢; No. 65, 340¢; No. 66, 345¢; No. 67, 350¢; No. 68, 355¢; No. 69, 360¢; No. 70, 365¢; No. 71, 370¢; No. 72, 375¢; No. 73, 380¢; No. 74, 385¢; No. 75, 390¢; No. 76, 395¢; No. 77, 400¢; No. 78, 405¢; No. 79, 410¢; No. 80, 415¢; No. 81, 420¢; No. 82, 425¢; No. 83, 430¢; No. 84, 435¢; No. 85, 440¢; No. 86, 445¢; No. 87, 450¢; No. 88, 455¢; No. 89, 460¢; No. 90, 465¢; No. 91, 470¢; No. 92, 475¢; No. 93, 480¢; No. 94, 485¢; No. 95, 490¢; No. 96, 495¢; No. 97, 500¢; No. 98, 505¢; No. 99, 510¢; No. 100, 515¢.
Miles' Challenge 45¢
New Triumph No. 605, 20¢; No. 610, 25¢; No. 615, 30¢; No. 620, 35¢; No. 625, 40¢; No. 630, 45¢; No. 635, 50¢; No. 640, 55¢; No. 645, 60¢; No. 650, 65¢; No. 655, 70¢; No. 660, 75¢; No. 665, 80¢; No. 670, 85¢; No. 675, 90¢; No. 680, 95¢; No. 685, 100¢; No. 690, 105¢; No. 695, 110¢; No. 700, 115¢; No. 705, 120¢; No. 710, 125¢; No. 715, 130¢; No. 720, 135¢; No. 725, 140¢; No. 730, 145¢; No. 735, 150¢; No. 740, 155¢; No. 745, 160¢; No. 750, 165¢; No. 755, 170¢; No. 760, 175¢; No. 765, 180¢; No. 770, 185¢; No. 775, 190¢; No. 780, 195¢; No. 785, 200¢; No. 790, 205¢; No. 795, 210¢; No. 800, 215¢; No. 805, 220¢; No. 810, 225¢; No. 815, 230¢; No. 820, 235¢; No. 825, 240¢; No. 830, 245¢; No. 835, 250¢; No. 840, 255¢; No. 845, 260¢; No. 850, 265¢; No. 855, 270¢; No. 860, 275¢; No. 865, 280¢; No. 870, 285¢; No. 875, 290¢; No. 880, 295¢; No. 885, 300¢; No. 890, 305¢; No. 895, 310¢; No. 900, 315¢; No. 905, 320¢; No. 910, 325¢; No. 915, 330¢; No. 920, 335¢; No. 925, 340¢; No. 930, 345¢; No. 935, 350¢; No. 940, 355¢; No. 945, 360¢; No. 950, 365¢; No. 955, 370¢; No. 960, 375¢; No. 965, 380¢; No. 970, 385¢; No. 975, 390¢; No. 980, 395¢; No. 985, 400¢; No. 990, 405¢; No. 995, 410¢; No. 1000, 415¢.
Woodruff's 20¢
Nos. 100, 150, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720, 740, 760, 780, 800, 820, 840, 860, 880, 900, 920, 940, 960, 980, 1000.
Chadborn's Smoked Beef Cutter 100¢
Enterprise Beef Shavers 25¢

Slaw and Kraut—

Henry Diss on & Son:
Slaw, Corn Grater, &c. 40¢
Kraut Cutters 24 x 7, 26 x 8, 30 x 9, 35 x 12, 40 x 12, 40 x 15.
Tucker & Dorsey Mfg. Co.:
Kraut Cutters 50¢
Slaw Cutters, 1 Knife, 1 gr., 15¢
Slaw Cutters, 2 Knives, 1 gr., 20¢

Tobacco—

All Iron, cheap 40¢
Enterprise 25¢
National 30¢
Sargent's 60¢

Washer—

Appleton's 60¢
Bonney's 40¢
Cincinnati 40¢
Tatum's 25¢

Diggers, Post Hole, &c.—

Gem, Improved 85¢
Iwan's Improved Post Hole Auger 40¢
Iwan's Perfection Post Hole Digger 100¢
Samson 34¢
Vaughan's Post Hole Auger 75¢

Dividers—See Compasses.**Dog Collars—See Collars, Dog.****Door Checks—**

See Checks, Door.

Door Springs—

See Springs, Door.

Drawers, Money—

Tucker's Pat. Alarm Toll No. 1, 10¢
No. 2, 15¢; No. 3, 11¢; No. 4, 11¢.

Drawing Knives—

See Knives, Drawing.

Drills and Drill Stocks—

Common Blacksmith's Drill, each 15¢
Bench Drills, Stearns' 50¢
Blacksmith's Self-feeding, each 75¢
Brest, Millers Falls, each 30¢
Brest, P. S. & W. 40¢
Goodell Automatic Drills 40¢
Ratchet, Bignall & Keefer 30¢
Ratchet, Curtis & Curtis 25¢
Ratchet, Fingersoll's 25¢
Ratchet, Parker's 40¢
Ratchet, Weston's 30¢
Ratchet, Whitney's 30¢

Whitney's Hand Drill, No. 1, \$10.00.

Adjustable, No. 10, \$12.00 33¢

Twist Drills—

Standard List 60¢

Drill Bits or Bit Stock

Drills—See Augers and Bits.

Drill Chucks—See Chucks.**Dripping Pans—**

See Pans, Dripping.

Drivers, Screw—

Balsey's Screw Holder and Driver 40¢
2 1/2-in. 30¢; 4-in. \$7.50 6-in. \$9.40¢
Brace Screw Drivers 25¢
Buck Bros' Screw Driver Bits 27¢
Chapman's Flat Blade, Elec. Fir. &c. 0¢
Diast-n's Flat Blade, Elec. Fir. &c. 0¢
Electric Spiral 50¢
Ellrich's Socket 40¢
Fray's Hol. H'dle Sets, No. 3, \$12.00 50¢
Gay & Parsons' Ratchet 55¢
Goodell's Automatic 50¢
Hercules, W. & B. 70¢
Howard-Allard Spiral 50¢
Jones Reversible 50¢
Knapp & Cowles: Nos. 1 and 2 70¢
Nos. 3, 4 and 5 60¢
Nos. 4 and 50, Acme and Ideal 60¢
Mayhew's Black Handle 50¢
Mayhew's Monarch 45¢
New England Specialty Co. 50¢
New York, Manhattan and Handy 30¢
Sargent & Co.'s: Nos. 1, 20, 40 and 60 50¢
Nos. 50 and 55 50¢
Screw Driver Bits 50¢
Stanley's R. & L. Co.'s: No. 64, Varnished Handles 70¢
No. 86 75¢
Syracuse Screw Driver Bits 40¢

Egg Beaters—See Beaters, Egg.**Emery—No. 4 to No. 54 to Flour, C.F.F.**

Reqs. 46 gr. 1.80 gr. F.F.F.
16 Reqs. 46 gr. 5¢
16 Reqs. 46 gr. 5¢
16 Reqs. 46 gr. 5¢
10 in cans, 10¢
In case 6¢
10 in cans less than 10¢ 10¢

Enameled and Tinned Ware—See Ware, Hollow.**Escutcheon Pins—**

See Pins, Escutcheon.

Extractors, Lemon Juice—

See Squeezers, Lemon.

Fastenings, Blind—

Zimmerman's 50¢

Faucets—

B. & L. B. Co.: West's Lock, Open and Shut Key 50¢
Burnside's Red Cedar 50¢
Burnside's Red Cedar, bbl. lots, 50¢
Cork Lined 70¢
Metallic Key, Leather Lined 65¢
John Sommer's Peerless Tin Key 40¢
John Sommer's Boss Tin Key 50¢
John Sommer's No Brand Metal Key 60¢
John Sommer's W. P. Metal Key 40¢
John Sommer's Diamond Lock 40¢
John Sommer's L. X. L. Cork Lined 50¢
John Sommer's Reliable Cork Lined 60¢
John Sommer's Common Cork Lined 70¢
John Sommer's Chicago Cork Lined 60¢
John Sommer's O. K. Cork Lined 50¢
John Sommer's Perfection Cedar 40¢
John Sommer's Cedar (in bbls.) 50¢
Star 60¢
Star, Metal Plug, new list 40¢
Stearns' Wood, No. 200, Wood-lined Key 50¢
Stearns' Matchless, Wood, No. 800, 60¢
Stearns' Gem, Wood, No. 400, 60¢
Lockport, Metal Plug, reduced list 60¢
Self Measuring: Enterprise 40¢
Lane's 40¢
National Measuring 30¢

Felice Plates—

See Plates, Felice.

Files—Domestic—

Best Brands 70¢
Good Brands 75¢
John Sommer's 80¢
Second Quality 80¢

Imported—

Stubs' Tapers Stubs' list, July 31, '97, 30¢

Heavy Hammers and Sledges—

3 and under..... 75¢ to 1.00
3 to 5..... 1.00 to 1.50
Over 5..... 1.50 to 2.00
Wilkinson's Smiths..... 90¢ to 1.00

Handcuffs and Leg Irons

See Police Goods.

Handles—

Agricultural Tool Handles—
Hoe, Rake, Fork, &c..... 60¢ to 1.00
S. oval, &c., WOOD Handle..... 60¢ to 1.00

Cross-Cut Saw Handles—

Atkins..... 40¢
Champion..... 45¢ to 1.00
Dixson..... 50¢
Ely's Perfection..... 50¢ doz. \$3.00

Mechanics' Tool Handles—

Auger, assorted..... 25¢ to 50¢
Auger, large..... 50¢ to 75¢
Brad Axl..... 1.00 to 1.50
Chisel, Tang..... 25¢ to 50¢
Chisel, assorted..... 25¢ to 50¢
Apple, assorted, large..... 25¢ to 50¢
Hickory, assorted, large..... 25¢ to 50¢
Hickory, assorted, large..... 25¢ to 50¢
Chisel, Socket..... 25¢ to 50¢
Screw, assorted..... 25¢ to 50¢
File, assorted..... 25¢ to 50¢
Hammer, Hatchet, Axe, &c..... 25¢ to 50¢
Hand Saw, Varied, &c..... 25¢ to 50¢
Plane Handles..... 25¢ to 50¢
Jack, &c..... 25¢ to 50¢
Fore, &c..... 25¢ to 50¢

Hangers—

Barn Door, New Pattern, Round Groove, Regular:
Inch..... 1.00 to 1.50
2 inch..... 1.50 to 2.00
3 inch..... 2.00 to 2.50
4 inch..... 2.50 to 3.00
5 inch..... 3.00 to 3.50
6 inch..... 3.50 to 4.00
7 inch..... 4.00 to 4.50
8 inch..... 4.50 to 5.00
9 inch..... 5.00 to 5.50
10 inch..... 5.50 to 6.00
12 inch..... 6.00 to 6.50
14 inch..... 6.50 to 7.00
16 inch..... 7.00 to 7.50
18 inch..... 7.50 to 8.00
20 inch..... 8.00 to 8.50
22 inch..... 8.50 to 9.00
24 inch..... 9.00 to 9.50
26 inch..... 9.50 to 10.00
28 inch..... 10.00 to 10.50
30 inch..... 10.50 to 11.00
32 inch..... 11.00 to 11.50
34 inch..... 11.50 to 12.00
36 inch..... 12.00 to 12.50
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76 inch..... 22.00 to 22.50
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80 inch..... 23.00 to 23.50
82 inch..... 23.50 to 24.00
84 inch..... 24.00 to 24.50
86 inch..... 24.50 to 25.00
88 inch..... 25.00 to 25.50
90 inch..... 25.50 to 26.00
92 inch..... 26.00 to 26.50
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Harness Menders—See Menders.**Harness Snaps—See Snaps.****Hasps—**

McKinney's Perfect Hasp, 2 doz. \$1.10
Wrought Hasps, Staples, &c.—See Wrought Goods.

Hatchets—

Refrigerator..... 40¢ to 1.00
Cheaper Brands..... 50¢ to 1.00

Hay and Straw Knives—See Knives.**Hinges—****Blind Hinges—**

Lull & Porter: No. 1..... 1 1/4 2 2 1/4
No. 2..... 1 1/2 2 1/2 3 1/2
1868 Old Pattern: No. 1..... 1 1/4 2 2 1/4
No. 2..... 1 1/2 2 1/2 3 1/2
Clark Mfg. Co.: No. 1 Blind Hinge, Old Pattern..... 80¢ to 1.00
No. 1 Blind Hinge, "Diamond" (with tip)..... 80¢ to 1.00
No. 1 Blind Hinge "Cottage" (with tip)..... 80¢ to 1.00
No. 2 Blind Hinge, regular..... 80¢ to 1.00
1868 Old Pattern..... 80¢ to 1.00
Nos. 1, 3, 5 Blind Hinges, "Victor" (with double tip)..... 80¢ to 1.00
No. 50 Blind Hinge,

Door Locks, Latches, &c.

[Net prices are very often made on these goods.]

Reading.....60@80&10%
 R. & E. Mfg. Co.....50&10@80&10%
 Sargent & Co.....50@80&10%
 S. B. & Co., Locks, Knobs, &c. 40@40&5%

Elevator—

Stowell's.....33%

Padlocks—

Wrought Iron, list Dec. 3, '97.75@75&10%
 Dog Collar, S. B. Co.....40%
 E. T. Fram:
 Cast Iron, Scandinavian.....90&40%
 Mal. Iron, 120 line.....90&10%
 Mal. Iron, 110 and 125 line.....65%
 All others.....50&5%
 R. & E. Mfg. Co. Wrt. S. steel & brass. 50%
 S. B. & Co.....40%

Sash, &c.—

Fitch's Patent.....65&10%
 Ives' Patent.....65&10%
 Payson's Perfect.....70%
 Payson's Signal.....70&10%
 Reading.....60&10&10@70%

Machines—**Boring—**

Without Augers.

Upright Angular.
 Boss, Carpenters' \$3.50
 Boss, Ship Builders' 3.75
 Douglas 2.50 \$3.00
 Jennings 2.50 3.00
 Millers' Falls 5.75
 Snell's, Rice's Pat. 2.50 2.75

Fluting—

Crown Jewel, 6 in.....\$3.50@2.75

Holisting—

Moore's Anti-Friction Differential Pulley Block.....30%
 Moore's Hand Hoist, with Lock Brake. 20%
 Maris & Beckley (Real Patent).....40%
 See also Blocks.

Washing—

Wayne American, No. 2, \$27.50
 Western Star, No. 2, 27.50
 Western Star, No. 3, 30.00
 St. Louis, No. 41, \$28.00

Mallets—

Hickory.....50@50&10%
 Lignumvitae.....50@50&10%
 Tinnars', Hickory and Applewood.....50%
 Fiber Head, Stearns'.....25%

Mattocks—

List Feb. 23, 1899.....70@70&10%

Measures—

Peck and Half Peck, See Wars, Standard Fiber.

Meat Cutters—

See Cutters, Meat.

Menders—

Centaur Harness Menders, \$ doz. \$6.00
 Jones' Hose Menders, \$ doz., 1/4 in., 40%
 1/2 in., 50%
 Victor Complete Nose Menders, \$ doz. \$3.50

Milk Cans—See Cans, Milk.**Mills—Coffee—**

Box and Side, list, Jan. 1, '88.....60&10@60&10&10%
 Net prices are often made on some goods which are lower than above discounts.
 Enterprise Mfg. Co., list Jan. 17, '93. 30%
 National, list Jan. 1, '94.....30%
 Parker's Columbia and Victor.....60&10%
 Parker's Upright.....30&10@40%
 Swift, Lane Bros.....33%

Mining Knives—

See Knives, Mining.

Molasses Gates—

See Gates, Molasses.

Money Drawers—

See Drawers, Money.

Mowers, Lawn—

Net prices are very frequently quoted
 10 12 14 16-in.
 Cheap.....\$1.65 \$1.70 \$1.75 \$1.80
 Medium.....2.20 2.75 3.00 3.25
 High Grade.....3.50 3.75 4.00 4.25
 Pennsylvania and Continental.....60&10&10%

Philadelphia:

All Styles except A and E.....70&10%
 Style A, all Steel.....60&10%
 Style E, Low Wheel.....60&10%
 Style E, High Wheel.....70&10%
 Racine.....60&10&10%

Muzzles—

Safety.....\$ gr. \$12.00@12.50

Nails—

Cut and Wire. See Trade Report.
 Wire Nails and Brads, Papered, List, May 1, '92.....85&10%
 Hungarian, Finishing, Upholsterers', &c. See Tools.

Horse—

Nos. 6 7 8 9 10
 A. C.....25 23 22 21 20
 American.....9 1/2 9 1/4 9 1/8 9 1/16 net
 Ausable.....28 26 25 24 23
 Capewell.....19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 C. B. K.....25 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Champlain.....25 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Clinton Fin.....19 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Maud S.....25 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Neponset.....23 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Putnam.....23 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
 Vulcan.....23 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Picture—

Picture Nails, 1 1/2 2 2 1/2 3 3 1/2 in.
 Bra Head, .90 .95 1.00 1.05 1.10 gr.
 P. R. Head, .85 .90 .95 1.00 1.05 gr.
 Crown.....50&10%
 Niles' Patent.....40&10%

Nippers, See Pliers and Nippers.**Nut Crackers—**

See Crackers, Nut.

Nuts—List Feb. 1, 1899.

Cold Punched. Off list.
 Mfrs. or U. S. Standard.....\$2.20
 Hexagon, plain.....5.90
 Square, C. T. & R.....6.00
 Hexagon, C. T. & R.....6.70
 Hot Pressed.
 Mfrs. U. S. or Nar. Gauge Standard.....\$2.20
 Square.....\$2.20
 Hexagon.....6.90

Oakum—

Best or Government.....\$ 5 1/2
 Navy.....\$ 4 1/2
 U. S. Navy.....\$ 5 1/2
 Plumbers' Spun Navy.....\$ 2 1/2
 F. O. B. New York. In car lots 1/2 off.

Oil Tanks—See Tanks, Oil.**Oilers—**

Steel.....70@70&10%
 Brass and Copper.....50&10@50%
 Zinc and Tin.....75@75&10%
 Malleable, Hammers' Improved, No. 1, \$3.60; No. 2, \$4; No. 3, \$4.40 \$ doz. 30%
 Malleable, Hammers' Old Pattern, same list.....50&10%
 Wilmot & Hobbs Mfg. Co.....70&10@75%

Openers, Can—

French.....\$ doz. 35¢
 Iron Handle.....\$ doz. 60¢/75¢
 Kio, Jakes, A. Rogers & Bros., \$ gro. \$ 50
 National, \$ gro. \$1.75@2.00
 Sardinia Scissors.....\$ doz. \$2.00@2.10
 Sprague, Iron or Wood Handle.....\$ doz. 40¢/45¢
 Stowell's.....75&10%
 Streeter's:
 Sensible, Japanned.....\$ gr. \$3.50
 Sensible, Nickel.....\$ gr. \$5.50
 Surprise.....\$ gr. \$3.50
 New Sprague, Metallic Handle, \$ gr. \$3.50
 New Sprague, Wood Handle.....\$ gr. \$4.50

Packing—**Rubber—**

Standard, fair quality.....70&10@75%
 Inferior quality.....75&10@80%
 Extra.....60&5@60&10&5%
 Jenkins' Standard, \$ 2 doz.....25@25&5%

Miscellaneous—

American Packing.....9¢ @ 10¢ \$ \$
 Cotton Packing.....13¢ @ 14¢ \$ \$
 Italian Packing.....10¢ @ 11¢ \$ \$
 Jute.....9¢ @ 5¢ \$ \$
 Russia Packing.....13¢ @ 15¢ \$ \$

Pails—**Creamery—**

S. S. & Co., with gauges, No 1 \$5.25; No. 2, \$5.50 \$ doz. 105

Galvanized—

Inch.....10 12 14
 Water, Standard, \$ gr. \$18.00 \$21.00 \$21.00
 Water, Competition, \$ gr. \$17.00 \$19.50 \$22.00
 Fire, \$ gr. \$2.00 \$25.00 \$30.00
 Well, \$ gr. \$21.00 \$25.00 \$27.00

Pans—**Dripping—**

Large Sizes.....\$ 4 @ 4 1/2
 Small sizes.....\$ 4 @ 4 1/2

Fry—

Standard List.....80@80&10%
 No. 10.....\$ 3
 Fry.....\$ 3.00 \$ 3.75 \$ 4.25 \$ 4.75 \$ 5.25
 No. 10.....\$ 3
 Fry.....\$ 3.00 \$ 3.75 \$ 4.25 \$ 4.75 \$ 5.25
 Fry Pans.....75@75&10%

Roasting and Baking—

Columbian, S. S. & Co., Nos. 5, \$ doz. \$10; 10, \$11.50; 20, \$13; 30, \$15.....60%
 Simplex No. 08, \$ doz. \$7.00; No. 09, \$8.50.....80%

Paper—**Building Paper—**

Per roll
 Rosin Sized Sheathing: 500 sq. ft. Light wt., 20 sq. ft. to lb.....\$0.35@0.40
 100 sq. ft. to lb.....\$0.55@0.60
 Heavy wt., extra quality.....\$0.95@1.05
 Barrett's Water Proof Sheathing.....\$1.35@1.75
 Medium Grades Water Proof Sheathing.....\$0.80 to 1.35
 Dealing felt, 9, 6 and 4 1/4 sq. ft. to lb., \$ ton.....\$42.50

Tarred Paper.

1 ply (roll 300 sq. ft.), \$ ton.....\$35@37
 2 ply, heavy, \$ roll 100 sq. ft.....\$75
 2 ply, light, \$ roll 100 sq. ft.....\$75
 3 ply, heavy, \$ roll 100 sq. ft.....\$1.30
 3 ply, light, \$ roll 100 sq. ft.....\$1.00

Sand and Emery—

List April 19, 1888.....50&10&5@60%

Parers—**Apple—**

Advance.....\$ doz. \$4.50
 Baldwin.....\$ doz. \$5.00
 Bonanza.....\$ each \$5.00
 Dandy.....\$ each \$7.50
 Europa, 1888.....\$ doz. \$12.00
 Family Bay State.....\$ doz. \$4.00
 Hudson's A. L. Star.....\$ doz. \$5.50
 Hudson's No. 1 King Table.....\$ doz. \$5.50
 Improved Bay State \$ doz. \$27.00@30.00
 New Lightning.....\$ doz. \$5.50
 Penn.....\$ doz. \$4.75
 Perfection.....\$ doz. \$4.00
 Reading 73.....\$ doz. \$7.00
 Reading 78.....\$ doz. \$4.50
 Turn Table.....\$ doz. \$4.50
 White Mountain.....\$ doz. \$4.00

Potato—

Saratoga.....\$ doz. \$5.50
 White Mountain.....\$ doz. \$4.50

Paris Green—

Arsenic kegs or casks.....\$ 12 @
 Kegs of 100 to 175 pounds.....\$ 12 @
 Kits of 14, 28 and 56 pounds.....\$ 13 @
 Paper boxes 5 to 5 pounds.....\$ 13 @
 Paper boxes 1 pound.....\$ 14 @
 Paper boxes 1/4 pound.....\$ 15 @
 Paper boxes 1/8 pound.....\$ 16 @

Picks and Mattocks—

List Feb. 23, 1899.....70@70&10%

Pinking Irons—

See Irons, Pinking.

Pins—**Escutcheon—**

Brass.....60@60&5%
 Iron, list Nov. 11, '85.....60@60&5%
 Pipe, Cast Iron Soil—
 Factory Shipments.
 Standard, 2-6 in.....70%
 Extra Heavy, 2-6 in.....70&5%
 Fixings.....75%

Pipe, Wrought—

Factory Shipments.

List February, 1899.
 Plain and Galv. sized.....60&10@10&10&5%
 Screw and Socket Castings.....52&4&5%
 Inserted joint casting.....47&4&5%
 Cold Drawn Seamless Steel Tubing.....60%

Planes and Plane Irons—**Wood Planes—**

Molding.....45@45&5%
 Bench, First quality.....50&5@50&10%
 Bench, Second quality.....50&10&5@60%
 Bailey's (Stanley R. & L. Co.).....50&10&10@50&10&10%
 Gage Self Setting.....35%

Iron Planes—

Bailey's (Stanley R. & L. Co.).....50&10&10@50&10&10%
 Chaplin's Iron Planes.....50&10%
 Miscellaneous Planes (Stanley R. & L. Co.).....25&10&10@50&10&10%
 Sargent's.....60&10&10@70%

Plane Irons—

Standard List.....30&10@30&10&10%
 Auburn Flatsole.....30&10@30&10&10%
 Buck Bros.....30%
 Butcher's.....\$5.00@5.25 to 6
 Stanley R. & L. Co.....50&10@50&10&10%
 L. & J. White.....20&5@25%

Plates—

Felloe.....\$ 3 @ 3 1/2 @ 3 3/4
 Self-Sealing Pie Plates (S. S. & Co.), \$ doz. \$2.00.....50%

Pliers and Nippers—

Acme Nippers.....50%
 Bernard's:
 Parallel Pliers, &c.....\$34¢
 Paragon Pliers.....50%
 Lodi Pliers.....50%
 Elm City Force Pliers.....35%
 Button's.....70&10@70&10&5%
 Cronk's Patent Pliers.....60%
 Cronk's Patent's Pat. Pliers.....60&10%

Cronk's Button Pattern.....70%**Cronk's Combs, Cutting and Gas Pliers.....\$ doz. \$20.00, 40%****Gas Pliers, \$ doz.:**

Best.....7-in. \$6.25 8-in. \$6.00 10-in. \$6.50
 Good.....\$2.50 2.75 3.00 3.50
 Heller's Farriers' Pincers and Tools.....40@40&5%

Morrill's Parallel, \$ doz. \$12.00.....30&5%**P. S. & W. Cast Steel.....50@50&5%****P. S. & W. Tinnars' cutting Nippers, add 6%.....10%****Utica Drop Forge & Tool Co.:**

Combination Pliers.....40&5%
 Side Cutting Pliers.....40&5%
 Hall Patent Nipper.....40&5%
 Round and Flat Nose Pliers.....40&5%
 End Cutting Pliers.....40&5%
 Royal Blue.....40&5%
 Glass Pliers.....40&5%
 Burner Pliers.....40&5%

Plumbs and Levels—

Plumbs and Levels.....70&10&10@70&10&10%
 Cook's.....40&10&10@40&10&10%
 Dickson.....70%
 Stanley R. & L. Co.....70&10&10@70&10&10%
 Stanley's Duplex.....25&10@25&10&10%
 Woods' Extension.....39&5%

Poachers, Egg—

Buffalo Steam Egg Poachers, \$ doz. No. 1, \$3.00; No. 2, \$3.00; No. 3, \$3.00; No. 4, \$12.00.....50%

Points, Glaziers'—

Bulk and 1 lb papers.....\$ 10 1/4 @ 11 1/4
 1/2 lb papers.....\$ 11 @ 12
 1 lb papers.....\$ 11 1/4 @ 12 1/4

Pokes, Animal—

Bishop's American.....\$ doz. \$2.75
 Bishop's L. X. L.....\$ doz. \$5.50
 Bishop's Steel Monarch.....\$ doz. \$4.25
 Bishop's Pioneer.....\$ doz. \$3.25
 Ft. Madison Hardware.....\$ doz. \$3.00
 Ft. Madison, Western.....\$ doz. \$3.50
 Ironclad, Sunbury, with strap.....\$4.25
 Ironclad, Sunbury, with snap, \$ doz. \$4.00
 Metallic Horse Poke.....\$ doz. \$5.00

Police Goods—

Bean's.....25%
 Tower's.....25%

Polish—Metal—

Prestoline Liquid, No. 1 (1/4 pt.), \$ doz. \$3.00; No. 2 (1 qt.), \$9.75.....40%
 Prestoline Paste.....\$ doz. \$3.00
 U. S. Metal Polish Paste, 3 oz. boxes, \$ doz. \$1.25; 1/2 lb boxes, \$ doz. \$3.25
 U. S. Liquid, 3 oz. cans, \$ doz. \$1.25; 1/2 lb cans, \$ doz. \$3.25
 Barkeepers' Friend Metal Polish, \$ doz. \$1.75; \$ gr. \$18.00
 Wynn's White Silk, 1/4 pt. cans, \$ doz. \$1.50

Stove—

Joseph Dixon's, \$ gr. \$5.75.....10%
 Dixon's Plumbago.....\$ gr. \$2.50
 Residue.....\$ gr. \$2.50
 Gem, \$ gr. \$4.50.....15%
 Japanese.....\$ gr. \$3.50
 Jet Black.....\$ gr. \$3.50
 Wynn's Black Silk, 5 lb pail.....\$ 12 @
 Wynn's Black Silk, 1/2 lb box, \$ doz. \$1.00
 Wynn's Black Silk, 5 oz. box, \$ doz. \$0.75
 Wynn's Black Silk, 8 oz. liq., \$ doz. \$1.00

Poppers, Corn—

Round or Square.
 1 qt.....\$ gr. \$6.00
 1 1/2 qt.....\$ gr. \$6.00
 2 qt.....\$ gr. \$10.00
 Quincy Corn Popper, 1 qt., \$ gr. \$17.00; 2 qt., \$22.00.

Post Hole and Tree Augers and Diggers—

See also Diggers, Post Hole, &c.

Potato Parers—

See Parers, Potato.

Pots—**Glue—**

Enameled.....40&10&5@50%
 Tinned.....40&5@40&10%

Powder—

In Canisters:
 Duck, 1 lb each.....45¢
 Fine Sporting, 1 lb each.....75¢
 Rifle, 1/2 lb each.....75¢
 Rifle, 1 lb each.....35¢
 In Kegs:
 Duck, 6 1/2 lb kegs.....\$2.25
 Duck, 12 1/2 lb kegs.....\$4.25
 Duck, 25 lb kegs.....\$5.00
 Rifle, 6 1/2 lb kegs.....\$3.00
 Rifle, 12 1/2 lb kegs.....\$3.25
 Rifle, 25 lb kegs.....\$4.00
 King's Smokeless:
 Keg (25 lb bulk).....\$20.00
 Half Keg (12 1/2 lb bulk).....\$10.25
 Quarter Keg (6 1/4 lb bulk).....\$5.25
 Canister (1 lb bulk).....\$0.90
 Case, 1 lb Canisters (50 lb bulk).....\$45.00
 Half Case, 1 lb Canisters (25 lb bulk).....\$22.75
 King's Semi-Smokeless:
 Keg (25 lb bulk).....\$10.00
 Half Keg (12 1/2 lb bulk).....\$5.25
 Quarter Keg (6 1/4 lb bulk).....\$2.75
 One Pound Can, bulk.....\$0.50

Presses—**Fruit and Jelly—**

Enterprise Mfg Co.....25@30%

Pruning Hooks and Shears—See Shears.**Pullers Nail—**

Crown, \$ doz. \$15.00.....50%
 Crown France, \$ doz. \$15.00.....50%
 Giant, No. 1, \$ doz. \$15; No. 2, \$16.50; No. 3, \$18.....40%
 National, \$ doz. \$24.00.....40%

Washers—	
Leather, Axle—	
Solid.....	80¢10¢10¢85¢
Patent.....	85¢85¢85¢
Coil.....	13¢ 14¢ 15¢ 17¢ 100.
Iron or Steel—	
Size bolt.....	5-16 3/4 1/2 3/4 1
Washers.....	\$4.75 3.50 2.75 2.50 2.50
In lots less than one keg add 1/4¢ per lb.	
5-b boxes add 1/4¢ to list.	
Washer Cutters—	
See Cutters, Washer.	
Washing Machines—	
See Machines, Washing.	
Water Coolers—	
See Coolers, Water.	
Weaners—	
Tyler's New Heater—No. 1 1/2 doz. \$3.45;	
No. 2, \$3.70; No. 3, \$4.00; No. 4, \$4.10;	
Tyler's Saver—Nos. 1 and 2, 1/2 doz. \$1.70;	
No. 3, \$2.00; No. 4, \$2.30.	
Weather Strips—See Strips,	
Wedges—	
Oil Finish.....	3.70@2.85¢
Axe Finish.....	3.00@3.10¢

Weights, Sash—	
Eastern: Carloads at factory.....\$14.00	
Less than carloads at factory.....\$17.00	
Western: Carloads at factory.....\$15.00@15.50	
Less than carloads at factory.....\$16.00@16.50	
Note—Some foundries are naming higher prices.	
Well Buckets Galvanized	
See Pails, Galvanized.	
Wheels, Well—	
8-in., \$2.00; 10-in., \$2.50; 12-in., \$2.75	
Wire and Wire Goods—	
Market: Nos. 0 to 18	
Br. & Ann.....	75¢75¢75¢105¢
Cop'd.....	72¢72¢72¢54¢
Galv.....	72¢72¢72¢54¢
Tin'd, Tin'd list.....	75¢75¢75¢75¢
Stone, Br. and Ann'd:	
Nos. 16 to 18.....	
Nos. 19 to 26.....	
Nos. 27 to 36.....	
Annealed Wire on Spools.....	
Brass, list Feb. 26, '96.....	
Copper, list Feb. 26, '96.....	
Cast Steel Wire.....	
Malin's Ann'd & Tin'd on Spools.....	
Malin's Brass & Cop. on Spools.....	

Steel Music Wire, 1/4 to 30, imported.....	
60¢70¢ 75¢	
Stub's Steel Wire.....	
\$5.00 to \$4.40¢	
Wire Clothes Line, see Lines.	
Wire Picture Cord, see Cord.	
Bright Wire Goods—	
Iron and Brass, list April 1, 1899.....	
40¢10¢50¢	
Note—The old high list is still used by many merchants, dis. 90¢90¢. 5.	
Wire Cloth and Netting—	
Galvanized Wire Netting.....	
80¢10¢80¢10¢10¢	
Painted Screen Cloth 100 ft. 1.20¢.....	
See Trade Report	
Wire Barb—See Trade Report	
Wire, Rope—See Rope, Wire.	
Wrenches—	
Agricultural.....	
80¢5¢80¢10¢	
Baxter's S.....	
70¢70¢5¢	
Coe's "Mechanics".....	
40¢10¢10¢5¢5¢	
Acme.....	
60¢60¢5¢	
Alken's Pocket (Bright).....	
\$2.00@3.20	
Alligator.....	
70¢70¢10¢	
Bemis & Call's.....	
35¢5¢	
Adjustable S.....	
40¢	
Brigg's Pattern.....	
30¢10¢	
Combination Black.....	
40¢10¢	

Combination Bright.....	
40¢5¢	
Cylinder or Gas Pipe.....	
55¢	
Extra Heavy.....	
45¢	
Merrick's Pattern.....	
50¢	
No. 3 Pipe, Bright.....	
50¢	
Bit Wrench, Adj., Tatum's.....	
1/2 doz. \$2.25.....	
25¢10¢	
Boardman's.....	
30¢	
Bull Dog, W. & B.....	
70¢70¢10¢	
Cincinnati Brace Wrenches.....	
25¢10¢	
Donohue's Engineer.....	
40¢10¢	
Eagle.....	
50¢10¢	
Hercules.....	
70¢10¢75¢	
Stevenson.....	
60¢10¢10¢	
Tatum's Brace Socket.....	
40¢	
W. & B. Machinists' Knife Hdl.....	
50¢10¢50¢10¢75¢	
W. & B. All Steel Pipe.....	
50¢10¢60¢	
W. & B. Drop Forged Engineers'.....	
35¢40¢10¢	
Wrought Goods—	
Staples, Hooks, &c., list March 17, '92.....	
85¢10¢90¢	
Yokes, Neck—	
Covert Saddlery Works, Trimmed.....	
70¢	
Covert Saddlery Works, Neck Yoke Centers.....	
70¢	
Yokes, Ox, and Ox Bows—	
Fort Madison's Farmers & Freighters'.....	
80¢	
Zinc—	
Sheet.....	
35¢	

PAINTS, OILS AND COLORS.—Wholesale Prices.

White Lead, Zinc, &c.	
Lead, Foreign white, in Oil.....	8 @ 8 3/4
Lead, American White, in Oil:	
Lots of 500 lb or over.....	5 1/4 @ 5 3/4
Lots less than 500 lb.....	@ 6 1/4
Lead, White, in oil, 25 lb tin	
pails, add to keg price.....	@ 1 1/4
Lead, White, in oil, 12 1/2 lb tin	
pails, add to keg price.....	@ 1
Lead, White, in oil, 1 to 5 lb as-	
sorted tins, add to keg price.....	@ 1 1/4
Lead, White, Dry in bbls.....	@ 5
Lead, American, Terms: On lots of 500	
lbs, and over, 60 days, or 25 for cash if	
paid in 15 days from date of invoice.	
Zinc, American, dry.....	3 3/4 @ 4 1/4
Zinc, French, S. & B. Red Seal.....	@ 7 1/2
Zinc, French, S. & B. Green Seal.....	@ 7 1/2
Zinc, Paris, Red Seal.....	@ 9 1/4
Zinc, Paris, Green Seal.....	@ 9 1/4
Zinc, Antwerp, Red Seal.....	@ 8 1/4
Zinc, Antwerp, Green Seal.....	@ 8 1/4
Zinc, V. M. in Poppy Oil, G. Seal	
lots of 1 ton and over.....	@ 10 1/4
lots less than 1 ton.....	@ 10 3/4
Zinc, V. M. in Poppy Oil, Red Seal	
lots of 1 ton and over.....	@ 9 1/4
lots less than 1 ton.....	@ 9 1/4
Discounts.—V. M. French Zinc.—Dis-	
counts to buyers of 10 bbl. lots of one or	
assorted grades, 1 1/2; 25 bbls., 2 1/2; 50 bbls.,	
4 1/2. No discount allowed on less than 10	
bbl. lots.	
Dry Colors.	
Black, Carbon.....	5 @ 40
Black, Drop, Amer.....	2 1/4 @ 5
Black, Drop, Eng.....	5 @ 10
Black, Ivory.....	10 @ 20
Blue, Celestial.....	6 @ 8
Blue, Chinese.....	30 @ 35
Blue, Prussian.....	28 @ 32
Blue, Ultramarine.....	5 @ 30
Brown, Spanish.....	1 1/2 @ 1
Brown, Vandyke, Amer.....	1 1/4 @ 2 1/4
Brown, Vandyke, Foreign.....	2 1/4 @ 5
Caroline, No. 40, in bulk.....	\$2.20@2.35
Caroline, No. 40, in 2 bottles.....	2.35¢
Caroline, No. 40, in ounce bot. 8.50@8.60	
Green, Chrome, ordinary.....	2 @ 10
Green, Chrome, pure.....	18 @ 24
Lead, Red, bbls. and 1/2 bbls.....	@ 5 1/4
Lead, Red, kegs.....	@ 6
Litharge, bbls. and 1/2 bbls.....	@ 5 1/4
Litharge, kegs.....	@ 6
Ocher, French Washed.....	1 @ 15 1/4
Ocher, German Washed.....	4 1/2 @ 5
Ocher, American.....	1 ton \$8.00@17.00
Orange Mineral, English.....	8 1/4 @ 9 1/4
Orange Mineral, French.....	10 1/2 @ 10 3/4
Orange Mineral, German.....	8 1/4 @ 9 1/4
Orange Mineral, American.....	8 1/4 @ 9 1/4
Red, Indian, English.....	4 1/2 @ 8 1/4
Red, Indian, American.....	2 1/2 @ 3
Red, Turkey.....	4 1/2 @ 8
Red, Tuscan.....	7 @ 14
Red, Venetian, Amer. 100 lb. 50 @ 70	
Red, Venetian, English.....	\$1.05@2.00
Sienna, Italian, Burnt and	
Powdered.....	2 1/4 @ 9 1/4
Sienna, Ital., Raw, Powd.....	2 1/4 @ 7
Sienna, American, Raw.....	1 1/4 @ 1 1/4
Sienna, American, Burnt and	
Powdered.....	2 1/4 @ 1 1/4
Talc, French.....	100 lb 90 @ 1.50
Talc, American.....	40 @ 65
Terra Alba, French, 100 lb.....	90 @ 1.00
Terra Alba, English.....	75 @ 80
Terra Alba, American No. 1.....	75 @ 75
Terra Alba, American No. 2.....	45 @ 50
Umber, Turkey, Bnt. & Pow.....	2 1/4 @ 3
Umber, Turkey, Raw & Powd.....	2 1/4 @ 3
Umber, Bnt. Amer.....	1 1/4 @ 1 1/4
Umber, Raw, Amer.....	1 1/4 @ 1 1/4
Yellow, Chrome.....	10 @ 25
Vermilion, American Lead.....	@ 10
Vermilion, Quicksilver, bbls.	
or kegs.....	@ 91
Vermilion, Quicksilver, bags.....	@ 92
Vermilion, Quicksilver, sm'r pkgs.....	@ 97
Vermilion, English, Import.....	70 @ 75
Vermilion, Artificial.....	5 @ 20
Vermilion Chinese.....	70 @ 75
Colors in Oil.	
Black, Lampblack, Best.....	10 @ 13
Black, Lampblack, Common.....	7 @ 9
Blue, Chinese.....	35 @ 40
Blue, Prussian.....	25 @ 35
Blue, Ultramarine.....	16 @ 20
Brown, Vandyke.....	7 @ 12
Green, Chrome.....	17 @ 22
Sienna, Raw.....	7 @ 10
Umber, Burnt.....	6 @ 10
Umber, Raw.....	7 @ 10
Whiting, Gliders.....	7 @ 10
Whiting, extra Gliders.....	@ 5 1/2
Miscellaneous.	
Barytes, Foreign, 100 lb.....	\$18.00@20.00
Barytes, Amer. floated.....	18.00@20.00
Barytes, Crude.....	8.00@10.00
Chalk, in bulk.....	1 ton 2.00 @
Chalk, in bbls.....	100 lb 35 @
China Clay, English.....	1 ton 10.00@17.50
Cobalt, Oxide.....	100 lb 1.76 @
Whiting, Common.....	100 lb 30 @
Whiting, Gliders.....	40 @ 45
Whiting, extra Gliders.....	@ 5 1/2
Putty.	
In barrels and 1/2 bbls.....	1 1/4-10 @ 1 1/4
In tubs.....	1 1/2 @ 1 1/2
In tin cans.....	1 1/2 @ 2
In bladders.....	1 1/2 @ 2
Spirits Turpentine.	
In Southern bbls.....	@ 44 1/2
In machine bbls.....	@ 44 1/2
Glue.	
Low Grade.....	7 @ 9
Cabinet.....	11 @ 15
Medium White.....	10 @ 15
Extra White.....	15 @ 25
French.....	10 @ 25
Irish.....	10 @ 12 1/2
Animal Fish and Veget-	
table Oils.	
Linseed, City, raw.....	1 gal. 49 @ 50
Linseed, City, boiled.....	51 @ 53
Linseed, Western, raw.....	47 @ 48
Linseed, raw Calcutta seed.....	55 @ 58
Lard, Prime City, present make.....	43 @ 45
Lard, Extra No. 1.....	35 @ 37
Lard, No. 1.....	30 @ 32
Cotton-seed, Crude.....	22 @ 22 1/2
Cotton-seed, Summer Yellow,	
prime.....	26 1/2 @ 27
Cotton-seed, Summer Yellow,	
off grades.....	25 1/2 @ 26
Sperm, Crude.....	50 @ 52
Sperm, Natural Spring.....	53 @ 55
Sperm, Bleached Spring.....	58 @ 60
Sperm, Natural Winter.....	57 @ 59
Sperm, Bleached Winter.....	62 @ 65
Whale, Crude.....	@ 9
Whale, Natural Winter.....	@ 46
Whale, Bleached Winter.....	@ 52
Whale, Extra Bleached Win.....	@ 52
Menhaden, Crude, Sound.....	24 @ 25
Menhaden, Light Pressed.....	29 @ 30
Menhaden, Bleached Winter.....	34 @ 36
Menhaden, Extra Bleached.....	34 @ 36
Tallow, Western, prime.....	42 @ 43
Cocoanut, Ceylon.....	5 1/2 @ 6
Cocoanut, Cochin.....	4 @ 4 1/2
Cod, Domestic.....	34 @ 36
Cod, Newfoundland.....	3 @ 4 1/2
Red Elaine.....	28 @ 30
Red Saponified.....	1 1/4 @ 4 1/4
Bank.....	@ 27
Straits.....	@ 28
Olive, Italian, bbls.....	58 @ 64
Neatsfoot, prime.....	48 @ 45
Palm, prime, Lagos.....	5 1/4 @ 5 1/2
Mineral Oils.	
Black, 29 gravity, 25@30 cold	
test.....	1 gal. @ 7 1/4
Black, 29 gravity, 15 cold test.....	@ 8 1/4
Black, summer.....	@ 7
Cylinder, light filtered.....	13 @ 15 1/4
Cylinder, dark filtered.....	11 @ 16
Paraffine, 23 1/4@24 gravity.....	8 1/4 @ 9
Paraffine, 28 gravity.....	7 1/4 @ 8 1/4
Paraffine, 28 gravity.....	7 1/4 @ 8 1/4
Paraffine, red, No. 1.....	8 1/4 @ 8 1/4
In small lots 1/4¢ advance.	

THE IRON AGE.

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Light and Tinned Copper.....	14	11
Heavy Brass.....	11	11
Light Brass.....	11	11
Lead.....	8	8
Tin Lead.....	8	8
Zinc.....	6	6
.....	17	17
No. 2 Pewter.....	10	10
Tin Plate scrap.....	ton	5
Wrought Scrap Iron.....	gross	ton 35.7
Heavy Cast Scrap.....	gross	ton 35.7
Stove Plate Scrap.....	gross	ton 36.0
Burst Iron.....	gross	ton 36.0

